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Original Communications

OBSERVATIONS ON THE ENDOCRINE DIAGNOSIS AND TREATMENT OF AMENORRHEA AND FUNCTIONAL UTERINE BLEEDING*

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IN A PREVIOUS communication¹ we noted the great number of patients suffering with functional menstrual disorders due to endocrine imbalance and formulated plans for the systematic study of such cases from the diagnostic and the therapeutic standpoint.

As a basis for diagnosis, it was proposed that in addition to the usual general and laboratory studies, tests should be made also for the determination of the estrin and of the anterior pituitary hormone content of the blood as well as a histologic study of the endometrium taken by curettage as close to the time of an expected period as possible. The test curettage and the blood hormone tests were to be made within twenty-four to thirty-six hours preceding the expected period, and if there was marked irregularity or amenorrhea, the time for the appearance of the menstrual flow was to be estimated as far as possible from menstrual menses. When these did not exist and no estimate of the monthly cycle was possible, blood tests for estrin determination were to be made once a week for five weeks, and the curettage undertaken as soon as a positive reaction was obtained. A positive reaction failing, the curettage was to be performed irrespective of the menstrual cycle.

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

We expressed the opinion that endometrial curettings furnish an important clue to the functional status of the ovary and of the anterior pituitary gland upon which the activity of the ovary is founded. According to the modern conception of the anabolic phase of menstruation, the endometrium depends for its development, from the post-menstrual through the interval to the premenstrual secretory phase, upon the elaboration by the ovary of follicular and lutein hormones in the proper proportion.

Our experience with those cases in which we had been able to study simultaneously the endometrium for its histologic picture and the ovary for lutein tissue seemed to support this view.

On the basis of these facts, it was said that the endometrial picture reflects the normal activity of the ovaries and, to go a bit further, indirectly of the anterior pituitary gland, and that it reflects any deviation from the normal activity in these two glands. In other words, the presence of a premenstrual endometrium before the expected flow may be taken as evidence of normal follicular and lutein preparation which usually denotes normal pituitary and ovarian function; any deviation from these findings at this period in the monthly cycle indicates some imbalance in the pituitary and in the ovarian function.

TABLE I. ASSOCIATION BETWEEN HORMONAL TESTS AND TEST CURETTAGE IN COMBINED AMENORRHEA, UTERINE BLEEDING AND STERILITY GROUPS

TEST CURETTAGE STATE OF ENDOMETRIUM	ESTRIN TEST			ANTERIOR PITUITARY TEST			TOTAL NO. CASES
	POSITIVE	THRESHOLD	NEGATIVE	APR I	APR II-III	NEGATIVE	
Premenstrual	26	14	12	0	1*	51	52
Early premenstrual	0	0	4	0	0	4	4
Premenstrual with local hyperplasia	1	0	2	0	0	3	3
Menstrual desquamation	0	0	2	0	0	2	2
Hyperplasia	4	9	15	6	2	20	28
Local hyperplasia with interval or atrophic changes	2	2	11	2	0	13	15
Atrophy	0	6	26	20	1	11	32
Carcinoma of fundus	0	0	1	1	0	0	1
Total No. of tests	33	31	73	29	4	104	137

*Due to pregnancy.

For the determination of estrin (female sex hormone), in the blood, the technic of Frank and Goldberger was selected and the results were classified as positive, threshold, or negative. For the determination of the anterior pituitary hormone in the blood, Fluhmann's modification of the Aschheim-Zondek test for pregnancy was selected and the results were classified on the basis of the cytologic changes in the ovary, as APR i (the ovulation reaction), APR ii (the hemorrhagic cyst reaction), APR iii (the luteinizing reaction), and also of course a negative reaction.

The purpose of the present writing is to report our experience in carrying out this plan with 174 patients in the Gynecological Endocrine Clinic at the Jefferson Hospital under the direction of Dr. Jacob Hoffman.*

The diagnostic findings and the therapeutic results obtained up to this time are given without venturing a final judgment (see Tables I to VIII).

TEST FINDINGS AND THE RELATION BETWEEN THEM

These show a wide variation; they admit of explanation, sometimes hypothetical. Our impression is that histologic studies of the endometrium combined with estimations of estrin and the anterior pituitary hormone give us a reliable index of ovarian and indirectly of pituitary function, but it is quickly evident that there is no constant association between the derangement of function and the symptoms it produces.

In explanation we may simply say that disturbances in the normal stimulation of the ovary by the ductless glands and in the function of the ovary may be manifested by any abnormality of the menstrual flow† and that the relations between them are not constant. This thought has already been expressed by Zondek.

AMENORRHEA

There were 85 patients: almost three-fourths were between twenty and thirty-five years of age; there were 15 under twenty and 9 cases over thirty-five years. In many the symptoms associated with the amenorrhea (see Table III) caused the most distress and formed the principal complaint. The results of a complete study of fifty-two of the cases are as follows: (See Table II.)

Endometrial Findings.—The curettings revealed an atrophic endometrium in a little more than one-third of the cases; there was an almost equal number of cases with a premenstrual endometrium. In a few cases the endometrium was hyperplastic. The atrophic endometrium was accompanied in half of the cases with a positive anterior pituitary, in other words, with hormonal evidences of a lack of ovarian function.

The premenstrual endometrium in amenorrhea may be explained perhaps by a persistence of the corpus luteum; the continued elaboration of progesterin that ensues prevents the disintegration of the endometrium and the menstrual flow. Whether the progesterin has an inhibitory effect upon some positive factor in the anterior pituitary or elsewhere which is normally responsible for the uterine bleeding or whether some other mechanism is involved, one cannot say.

*The laboratory studies were made by Dr. Jacob Hoffman in the Gynecological Research Laboratory of the Jefferson Medical College.

†Here the reader must bear in mind that what appears to be a normal or an abnormal menstrual flow may be uterine bleeding without ovulation (Corner, Robert Meyer).

TABLE II. ASSOCIATION BETWEEN HORMONAL TESTS AND TEST CURETTAGE IN AMENORRHEA

TEST CURETTAGE STATE OF ENDOMETRIUM	ESTRIN TEST			ANTERIOR PITUITARY TEST			TOTAL NO. CASES
	POSITIVE	THRESH-OLD	NEGATIVE	APR I	APR II-III	NEGATIVE	
Premenstrual	9	4	4	0	1*	16	17
Early premenstrual	1	2	1	0	0	4	4
Interval	1	4	0	0	0	5	5
Hyperplasia	0	0	1	0	0	1	1
Local hyperplasia	1	2	3	1	0	5	6
Atrophy	0	2	17	9	1	9	19
Total No. of tests	12	14	26	10	2	40	52

*Due to pregnancy.

TABLE III

ASSOCIATED SYMPTOMS AND CONDITIONS	NUMBER OF CASES		
	AMENORRHEA	UTERINE BLEEDING	TOTAL
Sterility	21	6	27
Vasomotor nervous symptoms	18	21	39
Dysmenorrhea	12	14	26
Headache (migraine)	10	17	27
Obesity	28	8	36
Secondary anemia	3	29	32
Frigidity	10	2	12
Skin eruptions	6	2	8
Retardation of secondary sex characteristics	2	0	2
Retardation of secondary sex characteristics (with hypophyseal cachexia)	4	0	4
Syphilis	0	4	4

So far as the hyperplastic endometrium found in a few cases of amenorrhea is concerned, the statement of Zondek may be recalled: while on the one hand a premenstrual endometrium may be accounted for by the presence of a persistent corpus luteum, on the other hand a thickened hyperplastic endometrium may be explained by persistent or atretic follicles without corpus luteum formation.

Hormonal Findings.—Estrin: We found the test for estrin negative in approximately one-half of the cases of amenorrhea and positive or threshold reactions almost equally divided in the other half.

Anterior Pituitary Hormone: The anterior pituitary test was negative in 40 of the cases; it was positive in 12. A positive finding of anterior pituitary hormone is usually indicative of a deficiency or a lack of ovarian function. Such has been the experience of Fluhmann and others. Our cases tend to agree with this view and these findings have proved in practice to be of the utmost importance from the diagnostic and the prognostic standpoint. By means of these findings it was possible to differentiate between functional amenorrhea and the amenorrhea dependent on anatomic defects (sometimes called afunctional) (Table IV). In the first, there is merely a derangement of function, which may

be restored either spontaneously or as a result of therapeutic measures. In the second, the follicular apparatus is almost entirely or wholly impaired either from actual anatomic changes such as follow x-ray or operations or even protracted inactivity with resulting atrophy or from some other unknown factors, and it cannot with rare exceptions be brought

TABLE IV. ANALYSIS OF THE ANTERIOR PITUITARY HORMONE REACTION IN 148 CASES

TYPE OF CASE	ANTERIOR PITUITARY HORMONE REACTIONS				TOTAL CASES
	APR I	APR II-III	TOTAL POSITIVES	NEGATIVE	
Normal ovarian function (regular 28-day menses)	0	0	0	28	28
Amenorrhea group (functional)*					
Oligomenorrhea, regular cycles	0	0	0	7	7
Amenorrhea, short duration	0	0	0	15	15
Amenorrhea, long duration	0	0	0	14	14
Amenorrhea, alternating with menorrhagia	0	0	0	3	3
Amenorrhea, associated with dysmenorrhea	0	0	0	3	3
Amenorrhea group (afunctional)†					
Primary amenorrhea	0	2	2	0	2
Congenital absence of uterus	0	1	1	0	1
Infantile genitalia	4	0	4	0	4
Operative castration	2	1	3	0	3
Radiation castration	1	2	3	0	3
Amenorrhea, long standing	3	0	3	0	3
Preclimacteric	1	0	1	0	1
Climacteric	0	1	1	0	1
Uterine bleeding (functional)*					
Bleeding, short duration	0	0	0	9	9
Bleeding, long duration	0	0	0	13	13
Bleeding, alternating with amenorrhea	0	0	0	7	7
Bleeding, associated with dysmenorrhea	0	0	0	7	7
Preclimacteric	0	0	0	8	8
Climacteric	0	0	0	3	3
Uterine bleeding (afunctional)†					
Bleeding, short duration	1	0	1	0	1
Bleeding, long duration	3	1	4	0	4
Preclimacteric	5	1	6	0	6
Climacteric	1	1	2	0	2
Total	21	10	31	117	148

*Majority amenable to treatment.

†Anatomic, sometimes called afunctional; not amenable to treatment with few exceptions.

back to normal function. Some of the cases exhibiting a positive anterior pituitary were in the preclimacterium or in the menopause; the younger women exhibiting this reaction almost without exception had had operations or irradiation which had partly or entirely destroyed the ovary. When the younger women gave no history of such treatment there were

indications of infantilism (primary amenorrhea), hypophyseal cachexia and in one case congenital absence of the uterus.

Most of the patients with a positive anterior pituitary reaction, young or old, complained of troublesome vasomotor nervous symptoms and headaches. These symptoms may be due perhaps either to overactivity of the anterior pituitary gland producing an actual excess of the pituitary hormone or the excess may be relative as when the neutralizing influence of the ovarian hormones is lacking entirely or is below the normal. With rare exceptions these cases failed to respond to treatment.

TABLE V. ASSOCIATION BETWEEN HORMONAL TESTS AND TEST CURETTAGE IN FUNCTIONAL UTERINE BLEEDING

TEST CURETTAGE STATE OF ENDOMETRIUM	ESTRIN TEST			ANTERIOR PITUITARY TEST			TOTAL NO. CASES
	POSITIVE	THRESH- OLD	NEGATIVE	APR I	APR II-III	NEGATIVE	
Premenstrual	2	2	2	0	0	6	6
Early premenstrual	0	0	4	0	0	4	4
Premenstrual with local hyperplasia	1	0	2	0	0	3	3
Menstrual desquamation	0	0	2	0	0	2	2
Hyperplasia	2	5	11	5	1	12	18
Hyperplasia with fibrosis and atrophy	0	0	2	0	1	1	2
Local hyperplasia with interval	0	0	6	1	0	5	6
Atrophy	0	2	6	7	0	1	8
Total No. of tests	5	9	35	13	2	34	49

TABLE VI. THERAPEUTIC MEASURES

THERAPEUTIC AGENT	NUMBER OF CASES TREATED		
	AMENORRHEA	UTERINE BLEEDING	TOTAL
Anterior pituitary luteinizing hormone*	2	53	55
Ovarian follicular hormone*	10	0	10
Ovarian follicular hormone plus ant. pit. luteinizing hormone*	15	3	18
Thyroid	32	11	43
Pelvic massage	54	32	86
X-ray stimulation to pituitary	36	27	63
X-ray stimulation to pituitary and ovary	4	2	6
X-ray sub-castration dose to ovary	0	3	3
X-ray castration dose to ovary	0	1	1
Iodine	3	2	5

*Furnished through the courtesy of Parke, Davis & Company.

In a few cases of amenorrhea a hyperplastic or a premenstrual endometrium appeared with positive estrin and negative anterior pituitary findings. In these the hypothesis of Zondek, mentioned above, of a polyhormonal state, that is, a condition of too much estrin (elaborated by the follicle) or a persistence of progestin (elaborated by the corpus luteum) may be reasonably explanatory. Since this is more of a derangement of function than a lack of it the prognosis is better.

It may be noted here that a positive estrin reaction just before an expected period is a reliable index at least of follicular activity. By some observers it is accepted as an index of full ovarian function. Nevertheless as it often accompanies a hyperplastic endometrium, which results from follicular without lutein activity, the endometrial curettings also must be studied in order to eliminate the possibility of misinterpretation.

UTERINE BLEEDING

There were 89 patients: about one-fourth were between puberty and twenty years of age; one-half were between twenty and thirty-five years of age and the remainder fell into the preclimacteric and the menopausal class. The result of a complete study of 49 of the cases is as follows: (See Table V.)

Endometrial Findings.—In more than half there were various degrees of endometrial hyperplasia. According to the experience of most observers, it is to be expected that this type of endometrium would accompany functional uterine bleeding. In a previous communication we gave the usual explanation of the changes in the mucosa and ventured an opinion as to the etiology of the bleeding.

Undeveloped and atrophic states of the endometrium were obtained in about 16 per cent of the cases. No conclusive explanation is offered for such findings; but we note that there were a few cases in which a second curettage revealed an atrophic endometrium although the first curettage had shown a hyperplastic endometrium. Possibly the atrophic endometrium was the end-result of the disintegration and discharge of the hyperplastic mucosa with hemorrhage and that the factors that produced the bleeding from the hyperplastic endometrium were still exerting their effect.

In 25 per cent of the cases there was a premenstrual endometrium. This may be accounted for by the hypothesis of Zondek, of polyhormonal bleeding; or, it may be ascribed to an unknown influence of the pituitary, the thyroid, or other glands. It is much more likely, however, that in such cases, despite a careful physical and pelvic examination, a constitutional disorder or a small pelvic lesion, such as a submucous fibroid, endometriosis, granulosa cell tumor of the ovary or some other condition is responsible for the symptoms and has been overlooked. We found organic lesions (myoma, endometriosis) in two patients who came to operation after treatment had failed; in both, the curettings had shown a premenstrual endometrium.

Hormonal Findings.—*Estrin:* Most noteworthy is the group of cases associated with various degrees of endometrial hyperplasia. It is significant that a positive estrin reaction was obtained in one-third of these cases. This would seem to lend weight to the theory which attempted to explain these so-called cases of polyhormonal bleeding (Zondek) as due

to a persistent follicle in the ovary, with subsequent accumulation and concentration of estrin, which then appears in the blood. Here there is a theoretical lack of progesterin and the substitution of luteinizing hormone by injection has its typical field of usefulness. Whether, as Zondek suggests and as we have proposed in a previous communication, the polyhormonal bleeding passes into polyhormonal amenorrhea, both being of the same genetic origin, is a matter of speculation. There have been 10 cases (uterine bleeding alternating with amenorrhea) in our series in which this appears to have occurred.

Anterior Pituitary Hormone.—Of the 60 patients on whom this test was performed, a positive reaction was obtained in only 13 or less than 25 per cent. In every case it was associated with either a hyperplastic or an atrophic endometrium and in no instance with a premenstrual endometrium. One-half of the patients giving a positive reaction were in the reproductive period; the others being in the preclimacteric or in the menopause. In the former there had been some damage by operation or otherwise to the ovaries and in the latter a positive finding was to be expected since they were probably entering or had entered the polyprolan stage of the menopause (Zondek). In the majority, both young and old, the bleeding was of long duration and accompanied with severe vasomotor nervous symptoms and headaches. With few exceptions these cases did not respond to treatment.

We may emphasize the fact that whenever a positive anterior pituitary hormone finding appears in functional uterine bleeding as well as in amenorrhea, the prognosis is poor (see Table IV). In our experience, the bleeding can be checked in these cases only by resorting to more radical methods, such as intrauterine irradiation with radium or x-ray castration to the ovary.

TREATMENT

Our therapeutic agents may be grouped as follows: (See Table VI.)

1. Organotherapy (thyroid, ovary, pituitary)
2. X-ray stimulation of the anterior pituitary
3. X-ray "depression"
4. X-ray in subcastration dose to the ovary
5. Bimanual pelvic massage

Proceeding on the assumption that both amenorrhea and menorrhagia may be of the same genetic origin, no matter what the results of the functional tests in the individual case might be, some combination of these therapeutic agents was employed for the purpose: first, of restoring the normal function of the anterior pituitary and the thyroid in their activation of the ovary; second, of promoting the normal follicular development, ovulation and the formation of a corpus luteum; and third, of temporarily supplying by substitution the missing or deficient anterior

pituitary and ovarian hormones. The need of treatment in either amenorrhea or uterine bleeding sometimes arises for the most part from the associated symptoms (see Table III) that are particularly troublesome.

Organotherapy.—1. *Thyroid* may be most important in the treatment of amenorrhea as well as in the treatment of uterine bleeding, especially in cases associated with hypofunction of the thyroid. It was used especially when obesity was a feature of the case even if the basal metabolism was normal.

2. *Ovarian hormones* at best constitute nothing more than substitution therapy, and they proved of very little value. Anterior pituitary luteinizing hormone was nearly always combined with them for the purpose of influencing both the follicular and the lutein phase of the cycle.

3. *Anterior pituitary hormones:* Following the lead of Novak and Hurd, a luteinizing hormone was used in 50 cases of uterine bleeding. In many instances striking results were obtained. This was especially true of the adolescent cases. In some cases in which it was used with immediate success the results proved to be only temporary. The intramuscular injection of luteinizing hormone is especially adapted to the treatment of young girls, because the other forms of treatment may produce undesirable psychologic effects. It may be stated also that while the injection of luteinizing hormone in women approaching the menopause cannot be advised unless preceded by a diagnostic curettage so as to eliminate the possibility of malignancy and other organic lesions, the infrequency of such conditions in young girls makes it comparatively safe to disregard them. If luteinizing hormone fails and the indications are urgent, then complete studies and the other therapeutic methods should be tried.

Luteinizing hormone ought to be administered in large dose (maximum 200 rat units a day for 10 days) and if it is not at once effectual, several courses of treatment may be given. In a few of the cases in this series it was only after several rounds that the bleeding was controlled and the periods became regular.

X-ray Stimulation of the Pituitary.—Since the anterior pituitary gland is the motor of ovarian function, one may try to increase its activity by small divided doses of the x-ray. No untoward effects have been observed in our patients and in many instances favorable results have been noted. Whether they have been the direct result of the treatment is conjectural. In explanation of this statement we recall the views of some roentgenologists that the x-ray never stimulates but always destroys. Perhaps the increased activity of the anterior pituitary after so-called x-ray stimulation is produced by the destruction of inhibiting

cells in the gland structure. It is of the utmost importance that the roentgenologist fully understand the technic of the procedure.*

X-ray Depression of the Pituitary.—In the future we propose to attempt depression of the anterior pituitary for the purpose of controlling troublesome vasomotor symptoms, especially headaches, in women of the preclimacterium or the early menopause. It will be limited to those in whom anterior pituitary hormone is found in the blood whether they exhibit amenorrhea or uterine bleeding and will be given on the assumption that the symptoms are produced by an excess of the anterior pituitary hormone that cannot be neutralized. Such therapy will not be used in younger women.

X-ray Stimulation of the Ovary.—The same question as to whether x-ray treatment can ever be stimulating applies to the ovary. One observer attributes the good effects of very mild exposures to a regression of persistent corpora lutea. Nevertheless since the follicular apparatus is especially susceptible to the x-ray, and as there is danger of irreparable damage, we have come to the conclusion that exposure of the ovary to x-ray treatment as a rule should not be used in the young or during the reproductive period. In our earlier studies this form of treatment was employed with bad results.

X-ray in Subcastration Dose to the Ovaries.—Partial inhibition of the ovary with the x-ray may be used at the menopause for uterine bleeding that resists other functional treatment.

X-ray in subcastration dose is adopted when the other functional plans have not sufficed; by careful dosage, the bleeding may be controlled but the menstrual periods not completely stopped. In this way patients may be eased into the menopause gradually instead of being thrust into it abruptly.

X-ray in castration dose to the ovary may ultimately be required in bleeding cases when a subcastration dose is ineffectual.

Intrauterine Irradiation with Radium.—Intrauterine irradiation with radium so promptly stops uterine bleeding that it has become a customary procedure in women of the preclimacterium or the menopause.

It has also been used in small doses for the intractable bleeding of young women, and it is usually quite possible to control the symptoms without any more than temporary interruption of the reproductive functions.

*"The stimulating dose used in treating the patients with functional amenorrhea or functional menorrhagia has been 5 milliamperes at 130 peak kilovolts through 4 millimeters of aluminum filter at 25 centimeter skin target distance for two minutes (5 ma, 130 KVP, 4 mm. Al, 25 cm. STD, 2 mins.) and is equivalent to 80r or about 15% of a skin erythema dose. This dose has been given through a port over the temporoparietal area, the center of the port being midway between the external canthus of the eye and the external auditory meatus. The dose has been given on alternate sides at weekly intervals for four weeks, so that the patient receives in four weeks this dose to each side of the skull twice.

"For the treatment of symptoms at the menopause we have decided to use a dose three times as great. This would be obtained by increasing the time of each treatment from two minutes to six minutes, and would multiply the dose of each treatment, in terms of r units from 80r to 240r, and the percentage of the erythema dose from 15% to 45% over each side."

But there is always some risk attached to irradiation of the uterus during adolescence, and there can scarcely be any argument that in young women it is better to regulate the menstrual function by means which carry no risk whatever of ultimate harm.

The same thing may be said of all women up to the age of the menopause. But when the possibility of reproduction is about at an end and the patient desires no continuation of the menstrual periods, the rapid results that follow intrauterine irradiation seem to maintain it as the procedure of choice.

Occasionally, however, this use of irradiation is followed with disagreeable sequelae and occasionally a patient is found who objects to it from fear of these sequelae which she has observed in someone else.

And so there have been included in our series a number of women of the preclimacteric and the climacteric group in order to see how often functional treatment is successful.

As a result of our experience, it is felt that in a certain proportion of the cases heretofore treated with radium, we may be better satisfied with the functional plan. In the pursuance of the latter one guards against overlooking pelvic cancer by the preliminary examination and curettage under an anesthetic; if functional methods fail, the patient has suffered no harm and irradiation with radium or the x-ray may still be employed.

Bimanual Pelvic Massage.—Following the lead of veterinarians who have long used analogous methods of dealing with stagnant ovaries and sterility in cattle, this treatment was carried out in most of the cases; we are not yet convinced of its merit. The massage is given for one increasing to five minutes. When properly used* it never produces more than slight pain and tenderness and this rapidly abates. It is employed on the assumption that a persistent follicle or a persistent corpus luteum is the cause of menstrual irregularities. Good results have seemed to follow this simple procedure in many cases. Whether it may promote rupture of the follicle by weakening its wall, or the regression of a corpus luteum by loosening its attachments one cannot say. Perhaps an improvement in the blood supply of the ovary may be explanatory. In several instances regular menstrual rhythm followed a single pelvic examination; it is true that this was probably a matter of pure coincidence; nevertheless, we cannot help asking whether one thorough palpation of a stagnant ovary may not at times produce results. Some of the good ascribed to ovarian preparations in the past may thus be explained.

Palpation of the ovaries must not be undertaken unless the condition of the parts is clear and there dare never be any suspicion of inflamma-

*The greatest care is exercised to avoid traumatism and especially so when the ovary is definitely enlarged and evidently the seat of a cystic follicle or a persistent corpus luteum.

tory disease, intrauterine or ectopic pregnancy or ovarian neoplasms. Pelvic massage should not be used at all or only with the greatest discretion in the young unmarried woman, the pelvic finger always in the rectum.

TABLE VII. AMENORRHEA GROUP—85 CASES

RESULTS OF TREATMENT	NO. CASES	PER CENT
*Return of periods for short time	20	23
*Periods regulated for 6 months	11	13
Periods regulated for 6-12 months (to date)	8	9
Periods regulated for over a year (to date)	3	3
Relief from associated symptoms	18	21
Periods regulated followed by pregnancy	0	0
Reduction of weight	5	5
Increase in secondary sex characteristics†	4	4
Development of endometrium from atrophic to premenstrual state	4	4
Absolute failures	15	27
Patients studied but not heard from since	27	31

*Not heard from since.

†Growth of pubic hair, development of breasts, rounding of contour.

TABLE VIII. FUNCTIONAL UTERINE BLEEDING, 89 CASES

RESULTS OF TREATMENT	NO. CASES	PER CENT
*Cessation of bleeding with regular periods for a short time	10	11
*Periods regulated for 6 months	11	12
Periods regulated for 6-12 months (to date)	16	18
Periods regulated for over 1 year (to date)	7	8
Formerly regular but profuse, now normal	2	2
Partial regulation of periods followed by amenorrhea	7	8
Return of bleeding following temporary relief	5	5
Relief from associated symptoms	16	18
Periods regulated and followed by pregnancy (sterility cases)	8	9
Absolute failure	13	14
Cases too recent to report	10	11
Cases untraceable	8	9

*Not heard from since.

Iodine.—Iodine was used in a few cases of amenorrhea of long standing, associated with obesity, after all other treatment had failed. In two instances the periods returned and were regular. It may be that clinically unrecognized cases of mild hyperthyroidism may be benefited with iodine therapy which is worthy of trial when other methods have failed.

CONCLUSIONS

In an evaluation of this experience in the endocrine diagnosis and treatment of amenorrhea and uterine bleeding, we realize that many of our ideas of endocrinologic gynecology are based upon animal experimentation. Unfortunately, the reaction in one species of laboratory animal is not readily duplicated, if at all, in another, and it may be still less likely to occur in the human being. The reaction in the lower

animals to the experimental endocrine secretions can only suggest what may be produced in the human being, and the effect of substitution products injected into human beings may be quite unlike their effect upon experimental animals.

We bear in mind also that amenorrhea and uterine bleeding sometimes undergo spontaneous cure without any treatment whatever or after the simple procedure of curettage and pelvic examination (see Tables VII and VIII).

With the above reservations, we submit the following conclusions:

1. Histologic studies of the endometrium, combined with blood tests for estrin and anterior pituitary hormone, are of value in addition to the usual clinical and laboratory study of endocrine patients in making a complete diagnosis of the condition at hand.

2. These tests are important before treatment is instituted, not only because they afford a reasonable diagnostic basis, but also because they are a gauge, by which subsequent observations may be measured; for example, some cases which show no premenstrual changes in the endometrium at the beginning, exhibit them later when function has been restored by treatment.

3. While test curettage is valuable at any period of life in differentiating functional bleeding from uterine polyp or other intrauterine organic lesions, not recognizable by palpation, it especially ensures against overlooking early malignancy of the endometrium in the later years of the reproductive period. Test curettage should not be used in young unmarried women, unless the symptoms are urgent and other functional plans of treatment have failed.

4. The test for estrin determination, although valuable as an index of follicular activity, does not always imply full ovarian function, since positive findings may sometimes be obtained in cases of endometrial hyperplasia, which is associated with an absence of the lutein phase of the cycle.

5. The presence of anterior pituitary hormone in the blood except during pregnancy and at the menopause is of grave prognostic import and the function of such patients, with few exceptions, cannot be restored.

6. A successful response to the treatment of amenorrhea is more likely in younger women, unless associated with infantile genitalia or damaged ovaries, the result of pelvic operations or irradiation. The longer the duration of the amenorrhea the less favorable are the results.

7. Functional treatment is preferable to other forms of treatment for uterine bleeding throughout reproductive life and especially in the adolescent. In women with uterine bleeding approaching the climacterium these studies are interesting and important, and it may be that in many cases functional treatment will be found preferable to intra-uterine irradiation which is the procedure usually selected.

8. Thyroid medication is apparently of service in a considerable proportion of the cases of both amenorrhea and uterine bleeding, and iodine occasionally has a place.

9. Ovarian hormones seem to be of little service.

10. Anterior pituitary luteinizing hormone in the treatment of uterine bleeding seems to be effectual in a fair proportion of cases although its mode of action is sometimes a matter of speculation.

11. Massage of the ovaries is still under trial; in many cases and especially in amenorrhea it has seemed to help in the restoration of function.

12. Stimulation of the anterior pituitary gland with the x-ray appears to be possible and is sometimes apparently responsible for a restoration of function.

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DISCUSSION

Dr. John T. Farrell, Jr.—I think that I can best discuss the x-ray aspect by attempting to clarify the terms of treatment. A year ago in discussing a similar paper before this Society, Dr. W. Edward Chamberlain pointed out that there is no such thing as a stimulating dose of x-ray, in the sense of stimulation of tissue growth. This is quite correct from the structural viewpoint, but so far as physiologic action is concerned one might speak of physiologic stimulation or physiologic depression in some instances. However, the roentgenologist often fails to realize that amenorrhea and menorrhagia are manifestations of the same disturbance of endocrine function, though he knows that a particular dose of x-ray administered to the pituitary in one individual will restore menstruation, while in another patient an identical dose will lead to diminution in excessive flow. This leads him to think that the gynecologist looks upon the action of the x-ray as depressive or stimulating, and confusion follows when one hears of "depressive dose" or "stimulative dose" in relation to the treatment of these functional disturbances. I think that if these terms were discarded and if one referred to these doses as "regulatory" that the roentgenologist would get a clear conception of the physiology.

The term "depressive" might be more properly reserved for reference to the treatment of that group of patients of whom Dr. Anspach spoke, who approaching the climacteric are annoyed with troublesome symptoms. In these patients one might hope to depress the function of the pituitary, and in them it would seem rational to use a larger dose of x-ray, arbitrarily two or three times as much as in the treatment of functional disturbances. On the other hand, one cannot say that the very small dose might not have the same effect in these patients that it has in the functional disturbances of younger women. In this particular group of patients it might be well to supplement the treatment to the pituitary by giving radiation over the ovary.

Dr. Anspach and Dr. Hoffman have shown commendable conservatism in their evaluation of the effect of x-ray. However, there are a sufficiently large number of similar cases, reported in the literature to substantiate the view that the x-ray is definitely of service in a certain percentage of functional disturbances of menstruation.

A FIVE-YEAR STUDY OF ABORTION*

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IT HAS been estimated that from 30 to 40 per cent of all pregnancies end in abortion during the first six months of intrauterine life (Watson). That it is a welcome termination in many cases is evidenced by the fact that no chance seems too great for some women to take to rid themselves of an existing pregnancy. Conversely, the loss of the fetus in women desirous of having children is often a sad disappointment and causes much unhappiness in this class of patients. Abortion does not always merely kill the fetus, but also causes the death of many women during the best years of their lives. Taussig¹ very aptly refers to the sword of abortion as being double-edged in its destructiveness, often causing the death of the mother as well as that of the fetus. The maternal deaths in the United States as a result of abortion are nearly as numerous as those due to childbirth. The average maternal death rate following abortion is said by Taussig to be 2.1 per cent. Based on 700,000 abortions which occur in the United States annually, this means that 15,000 women lose their lives from this cause each year. In the State of Oregon, a calculation of the death rate from causes connected with pregnancy was made for the years 1927 and 1928.² It was found that puerperal sepsis was responsible for 40.0 per cent of the maternal mortality and that 64.0 per cent of these patients died as a result of septic abortion. Much has been written regarding the prevention and treatment of puerperal sepsis but the prevention and treatment of septic abortion seems not to have been sufficiently emphasized. At present our treatment of postabortal blood stream infections is inadequate, for vaccines, antitoxins and blood transfusions are often of no avail. In teaching medical students, more emphasis should be placed on the proper management of abortion.

The object of this study is to emphasize the importance of conservatism in the handling of such cases. Every patient with a threatened, inevitable, or incomplete abortion, who has a temperature above normal, should be given an opportunity to develop an immunity to the uterine infection which is undoubtedly present. Many refer to low grade fever as sapremia. Watson³ considers each case a potential septicemia and

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advises against any interference with the interior of the septic uterus until we are sure that the activity of the organisms has ceased, as evidenced by normal temperature and leucocyte count.

This study includes all cases of abortion that have entered the Multnomah County Hospital, our teaching clinic, during the five years from January 1, 1927, to January 1, 1932. The term abortion as used in this discussion includes all cases of pregnancy from the earliest conception to the previable stage, or the twenty-eighth week of fetal life.

Our total number of cases was 341, which were classified as follows: threatened, 18 or 5.0 per cent; inevitable, 61 or 17.0 per cent; incomplete, 261 or 76.0 per cent; therapeutic, 1 or 0.3 per cent. In all of these cases with the exception of the last mentioned, the causative factors of the abortion occurred before the patient entered the hospital. The therapeutic abortion was done because of a decompensated heart disease which complicated the pregnancy.

Of the 341 cases, 169 or 43.6 per cent were classified as spontaneous, no information as to attempted interference with the pregnancy being obtained, while 149 or 43.0 per cent were either self-induced or were interrupted by an abortionist. In 22 instances or 6.4 per cent, the passage of an instrument or foreign body into the uterus was suspected and so recorded on the history. This estimate places induced or criminal abortions in this series at 43.6 per cent and if we add the 22 suspected cases, the total is a little more than 50.0 per cent. The patient's fear of exposure often conceals the truth regarding the etiology and there were probably many other induced abortions among those classified as spontaneous. Of the 149 induced abortions, 41 or 27.0 per cent were stated to have been performed by abortionists which included regular physicians, naturopaths, chiropractors, drugless healers, and others. In the self-induced, a great variety of means were used, the most popular being the catheter, which was resorted to in 34 instances or 31.0 per cent. Women are able to procure this dangerous weapon at many drug stores, where they are sold for abortion purposes. The slippery elm stick occupied second place as a choice of appliances with which to disturb pregnancy, being the offender in 24 or 13.0 per cent of these cases. When catheters or slippery elm sticks were not available, many other types of probes were used, such as crochet hooks, nail files, and syringe tips, and one patient used a nut cracker. Another introduced a case knife into the uterus. Among the different drugs used, quinine was the most popular. Turpentine, ergot, and numerous other medicines were also resorted to.

The average age of these patients was twenty-seven years, the greatest number, 173 or 50.0 per cent, occurring between the ages of twenty-one and thirty years. The ages ranged, however, from sixteen to forty-six years.

It is interesting to note that by far the greatest number of abortions, 278 or 81.0 per cent, occurred in married women. Of 51 who were single, 32 women had previously been married. Twelve refused this information. The number who admitted having had previous abortions was 176 or 51.6 per cent, 88 having had one, 42 two, and 27 three, the number gradually decreasing to one patient who had had eleven.

The parity of these patients also showed a wide variation, the present pregnancy being the first in only 48 instances or 14.0 per cent. Two hundred ninety-three or 86.0 per cent had had from one to eleven children. The greatest number, however, had borne from one to three babies.

The duration of pregnancy at the time the abortion occurred varied from one to twenty-eight weeks. The greatest number, 234 or 68.0 per cent, occurred between the first and the third month. Between the first and the second month there were 133 and between the second and the third month there were 101.

Pain, chills, and fever were the most common symptoms. Bleeding was present on admission in 314 patients or 92.0 per cent, and varied in amount, being described as slight in 46, moderate in 140, and profuse to the extent of hemorrhage in 122. A number of patients were badly exsanguinated at the time of admission, evidenced by the fact that 34 had an erythrocyte count below 3,000,000 and 19 had a hemoglobin below 50.0 per cent. Pain, situated in the lower abdomen, was present in 232 or 68.0 per cent. In the majority of instances it was intermittent and cramplike in character, except in those who had developed pelvic cellulitis and then the discomfort varied from a dull aching to severe pain in the pelvis.

Upon admission 128 or 37.0 per cent stated that they had had fever, while 71 or 20.0 per cent had had chills. We believe, with others, that chills indicate that the infection has spread beyond the confines of the uterus and that there is a beginning parauterine or systemic infection. Nausea and vomiting were also common complaints, and weakness was often given as one of the symptoms.

The duration of the symptoms varied from one day to four months. In 136 or 40.0 per cent, the symptoms had been present from one to fifteen days, and 41 patients stated that the symptoms started from sixteen days to one month prior to their admission to the hospital.

Upon examination, pallor of the skin was evident in many, due not only to hemorrhage but to infection and shock as well. Distention of the abdomen was rather uncommon, while tenderness was frequent, being present in 232 or 68.0 per cent. Rigidity of the rectus muscle was present in only 37 cases. A mass could be palpated in the lower abdomen in 26 patients. Tenderness of the abdomen often defeats the examiner in outlining a mass which may be present. The leucocyte count was above 10,000 in 151 patients or 44.0 per cent. Smears were positive for the gonococcus in 10 cases and the Wassermann reactions were positive in 12 others.

Of the 18 cases of threatened abortion, in 7 an attempt had been made, either by the patient or by an abortionist, to interrupt the pregnancy. Five patients showed evidence of sepsis, having fever ranging from 98.6° to 101.0° F. The leucocyte count in these patients ranged from 6000 to 19,600. In 7 cases it was above 10,000. The average total hospital days for this class was eight days. In 1 case pyelitis complicated the picture. Of the 13 patients, only 2 aborted the fetus before discharge from the hospital, but from the evidence derived from the histories it was our opinion that several may have gone on to abortion after leaving the hospital, for 5 signed their release and left against our advice. This was before we felt that they were well enough to be up, for 2 still had slight bleeding.

In making this analysis we divided our cases into two types; namely, febrile and afebrile. There were 34 or 9.7 per cent of these patients who had a normal temperature throughout their hospital stay. The leucocyte counts in 5 of these ranged from 10,000 to 17,000. Most of them recovered rapidly, the average hospital stay being but seven days. One patient in this group entered the hospital in a moribund condition as a result of hemorrhage and died within a few hours.

Of the febrile cases there were 307 or 90.3 per cent. These were divided into two groups. In the first group were those with low grade sepsis, in whom the temperature did not rise above 100.6° F. during their stay in the hospital. Of these there were 193 or 56.0 per cent. In the second group were those with frank sepsis, in whom the temperature was above 100.6° F. Of these there were 114 cases or 33.7 per cent. Of the 193 in the first group, or those with a temperature of 100.6° or lower, 98 had no leucocytosis and only a small blood loss, their recovery was

without complication, and their average stay in the hospital was eleven days. Thirty-three had no leucocytosis but showed considerable hemorrhage. Their average stay was also eleven days. Twenty-two had a leucocytosis in which the number varied from 12,000 to 34,000. The average number of hospital days for these patients was thirteen.

Of the 114 septic patients in whom the temperature was above 100.6°, 75 or 65.8 per cent followed a mild course and 39 or 34.2 per cent a severe course of illness. In the 75 first mentioned, the temperature variation was from 100.6° to 104° F. The duration of fever at this height was one day in 47 patients, two days in 23 patients, three days in 5 patients, and four days in only 1 patient. Nineteen showed marked anemia, while 25 had a leucocytosis above 10,000. They averaged twelve days in the hospital and there was no mortality. In 45 of the 75 patients there was a high temperature, ranging from 101° to 104° F., on admission, with a rapid drop to



Fig. 1.—Placenta in situ. Autopsy specimen. (Dept. Gyn. Path., Univ. of Oregon Medical School.)

normal in from twenty-four to seventy-two hours. In 24 instances this drop occurred just after the expulsion of either the fetus or the placenta.

Of the 39 patients who had a severe, prolonged course of illness, the temperature variation was from 99° to 105° with a duration of fever from five to fifty-six days. The average duration of the pregnancy at the time of abortion was two and one-third months. The abortion was induced in 20 or 51.0 per cent, interference suspected in 3 or 10.0 per cent, and said to be spontaneous in 16 or 39.0 per cent. There was an average duration of symptoms or illness for fourteen days before entrance to the hospital, which consisted chiefly of vaginal bleeding, pain, nausea, vomiting, chills, fever, and weakness. The admission temperature varied from 99° to 105° F. All were classified as incomplete abortions. The average leucocyte count was 14,000, and the average number of polymorphonuclear cells was 76.0 per cent. The sedimentation rate was markedly increased in most instances. In 3 cases blood cultures were made but none was positive. The complications noted in this

series were pelvic cellulitis in 14, pelvic abscess in 2, phlebitis in 2, and suspected thrombophlebitis in 8. Sixteen showed marked secondary anemia, having a hemoglobin below 50.0 per cent. There were two deaths in this group. The average number of hospital days was twenty-one and a half.

Postabortal infection begins within the uterus and nearly always at the placental site (Fig. 1). The bacteria concerned are numerous but



Fig. 2.—Appearance of the uterus in acute postabortive infection. Uterus is enlarged and edematous. Areas of necrosis of the walls are present.

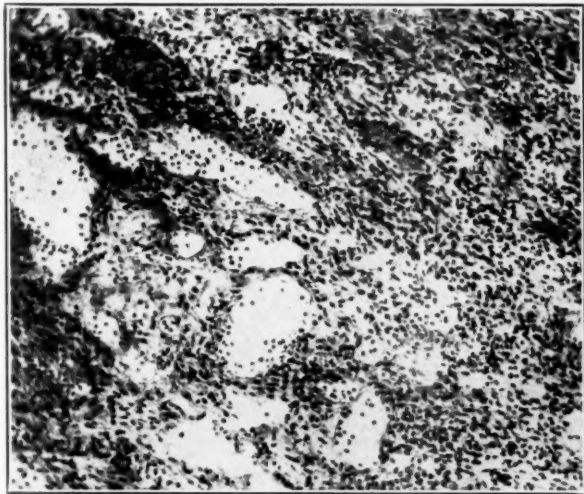


Fig. 3.—Microscopic appearance of uterine wall as seen in Fig. 2. Round cells and leucocytes are abundant with numerous areas of degenerated myometrium.

the streptococcus is usually responsible for the deaths that occur. The gonococcus may complicate the picture. The severity of the infection depends not only upon the virulence of the infecting organism, but upon the resistance of the patient as well (Figs. 2 and 3). Curtis⁴ has shown that a single intrauterine instrumentation is practically harmless in spite of the fact that bacteria are nearly always introduced into the endo-

metrial cavity. The low grade endometritis which is produced is very soon walled off by a protecting layer of leucocytes and usually goes on to resolution unless a second intrauterine instrumentation occurs, in



Fig. 4.—Specimen showing instrumental perforation of the uterus. Thrombosis of the uterine veins may be seen. Several areas of necrosis of the uterine wall are present.

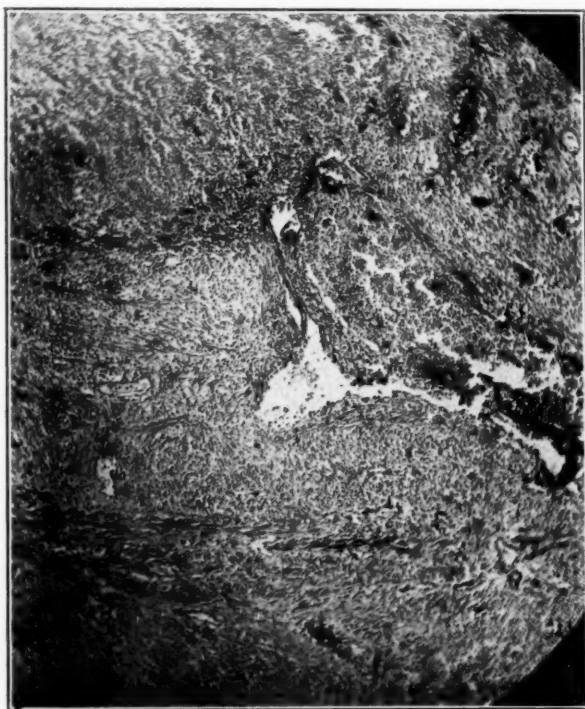


Fig. 5.—Section through uterine wall as seen in Fig. 4, showing microscopic appearance of thrombosed blood vessels. Thrombus is of the septic type, consisting largely of leucocytes and fibrin.

which case the barrier may be broken down, thus allowing the infection to spread beyond the confines of the uterus. Postabortal infections may then assume the form of cellulitis or thrombophlebitis, or may become systemic in their character. Postabortal or postpartum infections extend outward from the endometrial cavity by the blood vessels or by the

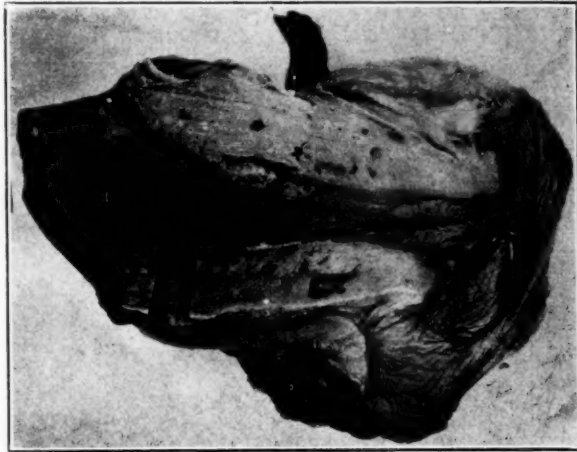


Fig. 6.—Postpartum infection of the uterus, showing multiple thrombi of the uterine wall. This patient died three weeks after delivery as a result of a hemolytic streptococcus blood stream infection.

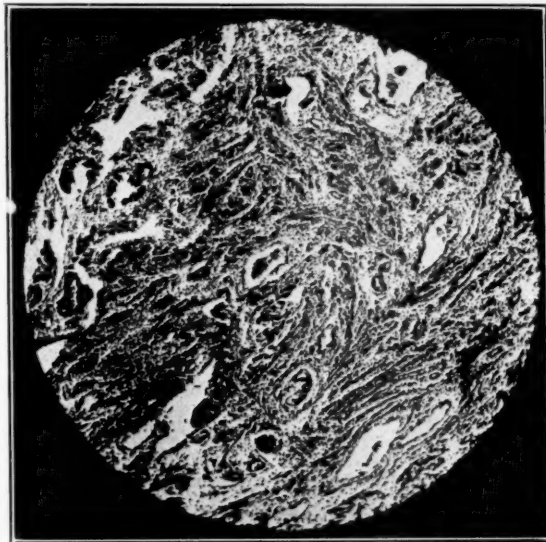


Fig. 7.—Microscopic appearance of the uterine wall as seen in Fig. 6. Thrombi may be seen in the smaller blood vessels with edema and round cell infiltration of the myometrium.

lymphatics. The increased vascularity of the pregnant uterus with a corresponding increase in the size of the lymphatic channels allows an early dissemination of the infection. Infected thrombi of the blood

vessels of the uterine wall and broad ligament are frequently found (Figs. 4, 5, 6, 7, 8). Blood stream infection occurs early because of this. The importance of lymphatic dissemination is shown by a series of 163 postmortem examinations in postpartum and postabortal sepsis in which Halban and Koehler⁵ found evidence of lymphatic spread in 115 cases and in 48 it was the only method of dissemination. When the infection passes through the lymphatics, it invades the cellular tissues of the broad ligament and may continue on to the serous surfaces, such as the peritoneum and pleura. Blood stream invasion in this type is late, and the organisms are thought to reach the blood through the thoracic duct. Cellular tissue infection causes the formation of exudates in these tissues, consisting largely of flocculent serum, and



FIG. 8.—Specimen showing thrombosis of the large veins of the broad ligament. Smaller thrombi may be seen in the broad ligament and in the uterine wall. (Courtesy of Dr. Frank Menne.)

at times causing a mass to rise in the abdomen to considerable height (Figs. 9 and 10). It is surprising how quickly such a tumor will disappear when the virulence of the infection subsides. Ovarian abscesses may occur and become persistent over a long period of time.

Peritonitis caused by organisms invading this cavity through the lumen of the fallopian tube is said to occur but the pathologic condition of the fallopian tubes in postabortal infections shows a perisalpingitis rather than an endosalpingitis, which would tend to support the view that unless complicated by active gonorrhea, this seldom occurs. Cul-de-sac abscesses, however, are not unusual and their origin is probably due to infection which reaches the peritoneum by direct extension through the cellular tissues, and produces a peritonitis which becomes localized at this point. Perforation of the uterus probably happens much

more frequently than we know (Figs. 4 and 5). Provided the intestine is not traumatized such injuries often go on to resolution without difficulty.

The pathologic diagnosis of tissues removed from our patients showed placental tissue and fetal structures with varying degrees of degenera-

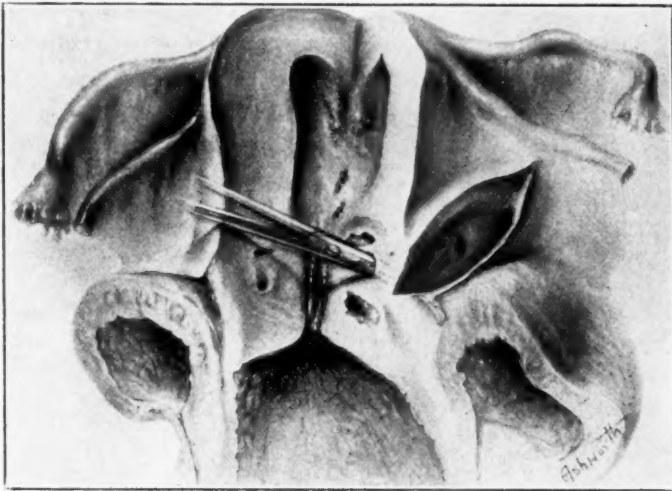


Fig. 9.—Broad ligament infection showing abscess formation (anterior view). Lymphatic type of dissemination of infection occurred in this case.



Fig. 10.—Posterior view of specimen as seen in Fig. 9. (a) Abscess cavity. (b) Rectovaginal septum showing cellulitis. (c) Lateral wall of uterus. Abscess cavity communicated with the cervical canal.

tion and infection in all instances. It is interesting to note that hydatidiform degeneration of the chorion was present in only two cases. It has been stated that this condition is present much more frequently than we suspect. Such a contention, however, is not borne out by this study.

TREATMENT

Ninety and three-tenths per cent of the patients in this series had a febrile course. We were therefore dealing with a septic, or potentially septic, disease of the uterus and surrounding tissues which required the strictest type of conservatism in management. Secondary anemia also added to the risk, as many of these patients had been bleeding for some time.

In the management or treatment of such patients there are two different plans advocated. One group believes in active treatment, consisting of immediate evacuation of the uterus in every febrile abortion unless perimetrial complications are present. The second group believes in conservative management, building up the patient's resistance, and waiting until the temperature has returned to normal and remained there from five to ten days, before invading the uterus. The contents are often expelled in the meantime, making its evacuation unnecessary. Only in the case of dangerous, uncontrollable hemorrhage is the rule violated. Most gynecologists in this country have adopted the latter conservative plan of treatment. Our routine orders are the following:

(1) Absolute rest in bed. (2) Provide a nourishing diet, forcing fluids, and give plenty of fresh air. (3) Elevate the head of the bed 12 inches except in severe hemorrhage. (4) Ice bag to pelvis. (5) Codeine or morphine for pain as needed. (6) No vaginal douches. (7) No vaginal examination is to be made except by the attending gynecologist or by his special order. (8) For bleeding give fluid extract of ergot, $\frac{1}{2}$ drachm, every four hours, supplemented with pituitrin if necessary. Dangerous hemorrhage is to be controlled by special means, such as packing the uterus or removal of the placenta, if indicated. (9) Leucocyte count is to be made and sedimentation rate determined every fourth day as a guide in management. (10) No case requires surgical interference unless an abscess is pointing extraperitoneally, such as culdesac or abdominal wall abscess. (11) It is generally agreed that five days or more of normal temperature and absence of leucocytosis, and a normal sedimentation rate are desirable before removing the remaining placenta, if such procedure is necessary. (12) Fluids, such as glucose or saline solutions, are given intravenously, subcutaneously, and rectally in the dehydrated cases or where there is need for fluid, as in hemorrhage, shock, or sepsis.

Under this routine management 225 or 66.0 per cent recovered without invading the uterus. Under general treatment, intravenous and subcutaneous glucose and saline solutions were used in many instances and proved their value, particularly in hemorrhage and shock. Fluids given by rectum were also useful. Blood transfusions were employed in 10 patients and would have been used many more times had donors been available. Their value in secondary anemia and in sepsis is generally recognized. Repeated milk injections were given in 7 patients who developed infections outside the uterus. Their usefulness, while

questioned by some, still warrants their employment in the endeavor to increase the patient's resistance.

In 36 instances hemorrhage was so marked that immediate surgical interference was necessary. In these patients the placenta was removed either by sponge forceps or by gentle curettage. Occasionally the uterus had to be packed even after the secundines were removed. Retained placenta, causing moderate bleeding, was the indication for evacuation of the uterus in 78 others. If previous curettage or instrumentation was suspected, placental remnants were removed, whenever possible, by the use of the sponge forceps alone. Every precaution was taken to avoid disturbing the barrier which had been formed in the uterus to wall off the infection. All patients subjected to curettage or evacuation of the uterus recovered and left the hospital in good condition. In no case did we invade the uterus if there was evidence of perimetrial infection. In one patient with a severe secondary anemia, abscess of the culdesae developed which required incision and drainage. The recovery was slow. During her convalescence she developed a phlebitis in one of her limbs. She was discharged after fifty-six days in the hospital. Two other patients with pelvic abscess recovered without surgical drainage.

There were 3 deaths in this series: 1 was due to acute hemorrhage and 2 were due to postabortal sepsis, making a total mortality of 0.88 per cent.

COMMENT

That invasion of the postabortal endometrial cavity produces an unfavorable reaction is evidenced by the fact that a rise in temperature occurred in 73 or 64.0 per cent of 113 patients in whom we did a curettage or evacuated the uterus by sponge forceps. In the majority of these patients the reaction was slight, causing an elevation of temperature of about 1° . In nine instances, however, there was a high fever following, averaging 3.2° with a duration of from two to seven days. Several of these women had a marked chill subsequent to the operation. Previous to the time of the evacuation of the uterus in the 9 patients last mentioned, 8 had normal temperature, while one with severe hemorrhage had a fever of 100.4° . While no immediate disaster happened following any case of intrauterine manipulation, perimetrial invasion by bacteria undoubtedly occurred, and the impaired future health of the patients, as a result of this, may make itself apparent in not a few instances. Curtis found virulent bacteria in the pelvic cellular tissues eighteen years following the primary infection. We are doing fewer evacuations of the uterus each year.

Another interesting finding in this group of cases was the rapid decline of temperature after the expulsion of the uterine contents. We interpreted this to be due to two factors, the first being the establish-

ment of drainage, and the second, a cessation in the absorption of toxic products of the infected and necrotic uterine contents under increased pressure. A medicinal agent which would cause the expulsion or help to expel the retained secundines, seems to be indicated in such instances.

One cannot conclude a study of this type without commenting on the incidence of criminal abortion. Women who are determined not to continue with pregnancy will resort to almost any means to interrupt it. If they cannot afford to go to an abortionist, they will try to abort themselves, using almost any method they think will be successful regardless of its danger to their lives or future health. Efforts to prevent abortions have not met with success, for there are probably more being done in the world at the present time than ever before. One effective way of preventing abortion would be the perfecting of accurate contraceptive methods with proper dissemination and use of such knowledge. It is true that many fine individuals are born each year whose conception was not planned, and such contraceptive measures might rob the world thereof; but on the other hand, the ninth, tenth, or eleventh conception of many indigent parents would be guarded against the hazard of the crochet hook or other like instrument.

CONCLUSIONS

1. Three hundred forty-one cases of abortion were studied with reference to their incidence, course, and the outcome of conservative management.
2. Criminal abortion occurred in 50.0 per cent of the cases.
3. Repeated abortions occurred in 45.4 per cent of all cases.
4. Eighty-one per cent occurred in married women.
5. A febrile course was followed by 90.3 per cent.
6. Hospital supervision should be insisted upon in all cases.
7. Infected patients will nearly always develop an immunity to their infection if given an opportunity.
8. The term sapremia should be discarded, as it implies a nonseptic state.
9. Hydatidiform degeneration of the chorion was present in only two instances.
10. Under conservative management, the mortality rate was 3 deaths or 0.88 per cent.
11. Contraceptive measures should be more widely taught.

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HEMATOMETRA CERVICALIS, WITH SPECIAL REFERENCE TO PELVIC ENDOMETRIOSIS*

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HEMATOMETRA, confining itself to a saccular dilatation of the cervix uteri, without corporeal involvement, is exceedingly rare. A review of the literature, regarding the accumulation of blood in the female genital tract reveals that most cases reported presented an advanced stage with massive distention of the vagina, entire uterus, and the fallopian tubes. Undoubtedly, surgical or spontaneous opening of stenosed cervices have relieved many cases in which the cervix has been the only part involved but no instances portraying the early pathologic changes could be found in any of the reports. Not alone the rarity of the condition but, especially, the question of regurgitation of endometrium and blood in the genital tract and the bearing of the latter upon the problem of endometriosis of the pelvic peritoneum warrant the report of the case to be presented.

Pathologically, the occluding process is usually located at the external or internal os, but any position or the entire canal may have lost its epithelial lining with subsequent cohesion of the apposed granulation or connective tissue surfaces. It is generally accepted that the amassing of blood first takes place above the site of obstruction. As the blood settles or is forced to this point, the contracting uterine musculature of the corpus uteri attempts to push the blood through the obstruction. The cervix, being the weaker and noncontracting part of the uterus, undergoes dilatation. If the barrier is not complete or firm enough, small amounts of blood may escape into the vagina when the uterine contractions are strong during menstruation. If this force is sufficient, the opening may enlarge enough to permit a continuous and complete discharge of blood with each menstrual period. However, as in the case to be reported, a small amount of bleeding may occur at one or more menstruations and following this fibrous obliteration may take place during the following intermenstrual period. Dilatation of the corpus by menstrual blood takes place after cervical distention has developed. Of course, if the stenosis is at the level of the internal os corporeal involvement will take place at an earlier date. Saccular distention of the body may require a relatively short period of time as evidenced by Gellhorn's case in which the uterus was the size of a grapefruit after

*Presented at a meeting of the Chicago Gynecological Society, February 17, 1933.

the first menstruation following the occlusion of the cervical canal by radium. Escape of the retained blood in the uterus can occur by spontaneous rupture into the vagina, which is the most frequent, but the bladder and the rectum have also been the avenue of discharge. Operative interference may immediately permit the structures to return to their normal state and pregnancy has rewarded conservative measures in women of the childbearing age. The amount of dilatation is dependent upon the duration of the condition and the amount of bleeding that accompanies each menstrual period. However, as the amount of blood increases in the uterine cavity the expansile intrauterine pressure probably decreases the amount of bleeding from the endometrium by a process of capillary compression and in addition some pressure atrophy of this layer takes place but it seems that some of the endometrium always remains. Also, this same pressure causes the uterine musculature to first hypertrophy, in order to overcome the resistance, but later atrophy of this layer permits loss of contracting power and thinning out of this layer.

The quantity and character of the blood in the uterine cavity will vary with the duration of the condition and some of the already considered factors. As much as 3 liters of fluid has been found. Mucin and lactic acid, in the absence of lactic acid bacilli, have been reported as being present in this blood. Fibrin ferment and fibrinogen are absent. Laked erythrocytes make up the major portion of the fluid. The fluid is usually sterile but infection may take place from the blood stream, intestines, or by surgical interference (Binet quoted by Frank). The infected blood is usually very odorous and may be hemorrhagic purulent, or frankly purulent.

CASE REPORT

Patient, white, fifty-one years of age. On Nov. 13, 1931, a large, cystic, and eroded cervix, which had been bleeding for some time was amputated by another physician. According to the hospital records, the cut surfaces were approximated with chromic catgut sutures, and a gauze packing was inserted into the vagina. In the afternoon of the same day her pulse was thready, the temperature 101.6°, and she appeared to be in shock. One liter of normal saline was given intravenously at this time. On the second postoperative day she had severe abdominal cramps, a temperature of 103.8°. The vaginal packing was removed. On the third day after the operation there was a small amount of bloody vaginal discharge. Because of the stormy postoperative course an x-ray examination of the chest was done but there was no evidence of pulmonary collapse or pneumonia. By the eleventh day, following the operation, the abdominal pain, bloody vaginal discharge, and temperature had subsided. She was discharged from the hospital on the fourteenth postoperative day.

She was symptom-free after leaving the hospital until five weeks after the operation. At this time the patient had severe pains in the lower abdomen and back of a labor-like character. Accompanying the pain was the passage of a small amount of clotted blood from the vagina for a period of two days. The same symptoms recurred on two occasions in March of 1932. In May of 1932 she bled

on the eighth and ninth and stated that she felt as though something was holding the blood back and that she had to urinate very frequently at this time.

She also stated that she had a right inguinal hernia since her last pregnancy nineteen years before.

Moderate cysto- and rectocele were present, and there was a small amount of brownish discharge in the vagina. The portio vaginalis of the cervix could not be made out, the fornices forming one continuous flush surface in which no external cervical os could be palpated with the finger or with a uterine probe. The corpus uteri was enlarged to twice its normal size, round in outline, but movable. The appendages were not enlarged or tender. A small right indirect inguinal hernia was also present.

Operation, May 21, 1932, by Dr. Emil Ries, consisted of anterior colporrhaphy and colpoperineoplastic for cysto- and rectocele. A well curved right half of a Pfannenstiel incision was carried through the skin and subcutaneous tissues. The right indirect inguinal hernial sac isolated, ligated, cut, and then the usual Bassini repair of the muscle and fascial layers was performed. The left half of the Pfannenstiel incision was now completed in the usual manner. On opening the peritoneum it was seen that the serosa of the exposed large and small intestines in the lower half of the abdomen was diffusely stained by dark red to purple unclotted blood. The uterus was in an anteverted position, enlarged to the size of a three and one-half months' pregnancy, moderately soft in its lower half, and no adhesions were present about the body of the uterus. The right fallopian tube, though embedded in adhesions, was patent. The right ovary was of normal size and adherent to the posterior surface of the broad ligament by thin vascular adhesions. The left tube was slightly thickened, tortuous, and adherent to the left ovary. The latter was the size of a hen's egg and adherent to the posterior surface of the broad ligament. In freeing the appendages of the left side, a 3 cm. cyst filled by chocolate colored liquid was ruptured, revealing a distinct yellow wall lining the inside of the cavity. The left infundibulopelvic ligament and the right broad ligament, close to the lateral wall of the uterus were clamped, cut and ligated. The upper portion of the uterus now being relatively free, the cervix could be identified as a saccular, rounded structure of flabby consistency that was enlarged to fully twice its normal size. The posterior surface of the cervix was firmly adherent to the anterior rectal wall by firm vascular adhesions. A complete hysterectomy was then carried out as usual and in spite of the fact that the cervix was so markedly dilated the ureters were not exposed at any time during the operation. The patient made an uneventful recovery and left the hospital two weeks after the operation.

The uterus (Fig. 1) on sagittal section, and not fixed in formalin, showed that the cervical portion was dilated by 44 c.c. of unclotted, thick, and deep red blood in the central portion. The inner wall of the cervix was lined by a layer of slightly adherent clotted blood up to 0.8 cm. thick. After fixation in 10 per cent formalin solution for twenty-four hours, the entire uterus measured 9.5 cm. from the fundus to the position of the external os. The width between the insertion of the tubes was 9.5 cm. The constricted portion, representing approximately the level of the internal os was 5 cm. in diameter. The greatest diameter of the dilated cervical portion was 6.8 cm. transversely and 6 cm. anteroposteriorly. The anteroposterior thickness of the corpus was 4.2 cm. The lower pole (vaginal portion) of the dilated and shell-like cervix presented a 2 and 5 mm. dimpled area, but at these points no external os could be elicited, so that there was no communication between the vagina and the blood distended cervix.

The left fallopian tube was 8.2 cm. long, slightly tortuous, and up to 1.1 cm. in diameter through the ampullar portion. The lumen contained a small amount of unclotted blood and was patent throughout.

Microscopic Examination.—Sections from the thinned out obstructing wall between the cervical cavity and the vagina including the two dimpled areas probably representing the previous site of the external os, showed markedly elongated mature connective tissue cells with marked hyalinization and no evidences of a communicating tract through the dimpled areas where the layer of connective tissue was about one-third thinner than the surrounding connective tissue wall. There were no evidences of epithelial cells lining the inner aspect nor any stratified epithelium covering the vaginal side of these two small defects.

Tissue from the lateral aspects of the dilated portion of the cervix was composed of a dense muscular and connective tissue wall. The cells of this layer were very elongated particularly in the lower one-half of the cervix. The cells lining the inner

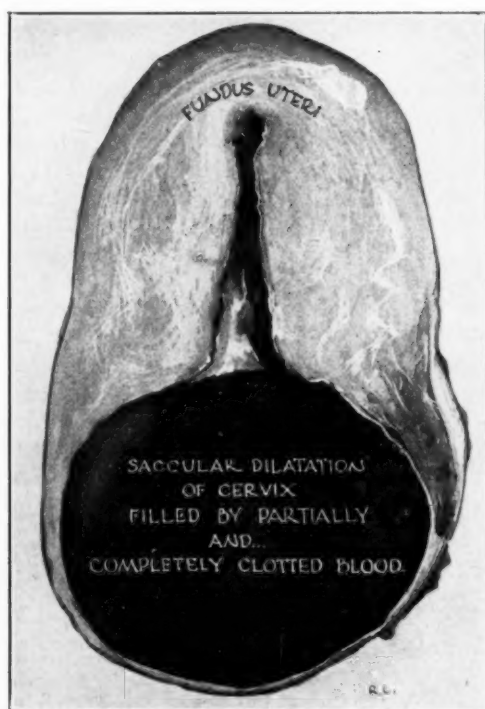


Fig. 1.—Uterus removed by hysterectomy showing markedly blood distended cervical portion and above this the enlarged and thick walled fibrotic corpus uteri.

wall of the cervix varied from a flat mucous cervical type of gland to a high cylindrical type as the region of the internal os was reached, and at the latter region the cells tended to assume the character of low folds but in no places were there any distinct glandular structures that could represent actual cervical glands. The clotted blood on the inner wall of the shell of the cervix was well organized.

Sections of the centrifuged liquid portion of the blood contained in the central portion of the dilated cervix were made up of erythrocytes in varying stages of degeneration and a few polymorphonuclear leucocytes. In addition, several small fragments of rows of surface and glandular epithelial cells containing centrally located dark staining nuclei rested on a distinct layer of connective tissue stroma (Fig. 2). These cells, with the stroma, presented all the histologic criteria of endometrium rather than the mucous cells lining the cervix.

Sections from the uterine wall including the endometrium and muscularis from the level of the internal os to the fundus of the uterus (Fig. 3). The endometrium showed the typical changes of the menstrual stage with fairly well preserved erythrocytes in the superficial layers, in the lumen of the glands, and in the cavity of the uterus. In many areas the glandular epithelium was well preserved and consisted of an intact cellular wall but in most places marked cellular disintegration

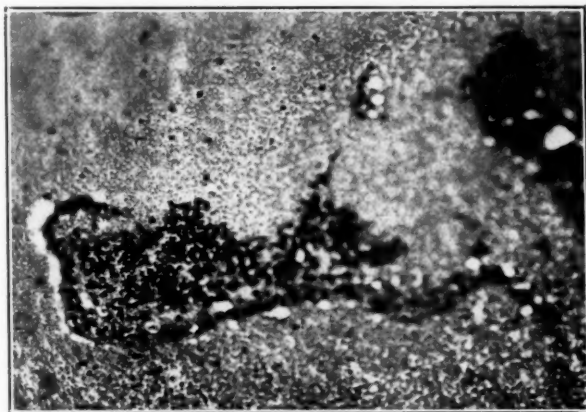


Fig. 2.—Section of centrifuged specimen of liquid portion of blood from the dilated cervix surface showing epithelium and stroma of the endometrium.

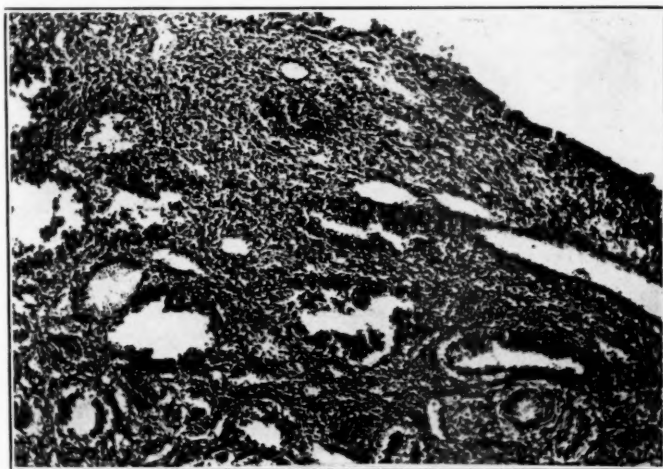


Fig. 3.—Layer of endometrium with muscularis of corpus uteri demonstrating desquamation of glandular epithelium, hemorrhage into the lumen of the glands, and into the superficial layers.

had taken place and irregular shaped pieces of glandular epithelium could be found in the lumens of the glands. The cells forming the walls of the glands were arranged in a layer two to three deep, had an indiscernible cell membrane and for the major part consisted of large nuclei that had a well-defined nuclear membrane inside of which were sparsely scattered basophilic granules. The surface epithelium of the endometrium was high cylindrical cells stained poorly with eosin, and contained large nuclei that were stippled with basophilic granules. In numerous places

the surface epithelium was completely gone and at other levels was replaced by varying sized and thick layers of red blood cells. Near the fundic portion of the uterus the muscularis was distinctly invaded by endometrial glands.

Isthmic portion of the left fallopian tube showed the lumen partially filled by masses of erythrocytes and an occasional clump of vascular connective tissue stroma which was completely surrounded by a single layer of nonciliated cylindrical cells, containing a deeply staining large nucleus. Serial sections of these clumps did not reveal any connection with the tubal folds in these areas. The subserosa of the uterine horn was thickened by a fibrillar connective tissue network that contained numerous dilated capillaries but no structures resembling endometrial tissue.

Ampullar portion of the same tube, at different levels, demonstrated varying quantities of blood within the lumen and occasional clumps of epithelium that, microscopically, corresponded to the surface epithelium lining the endometrium of the uterine cavity (Fig. 4). The tubal folds were lined by moderately high cylindrical epithelium with distinct cilia and contained moderate sized and densely

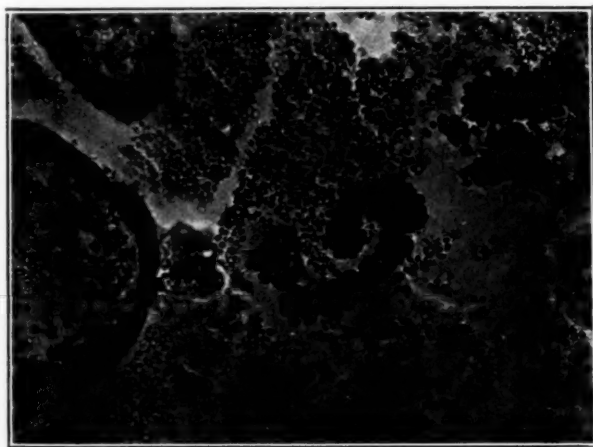


Fig. 4.—Section through ampullar portion of the fallopian tube showing well-preserved erythrocytes and a clump of nonciliated epithelium in the lumen.

stained nuclei located in the basal portion of the cell. The stroma of the folds consisted of markedly dilated and engorged capillaries and in the extravascular spaces were lymphocytes and connective tissue cells. In many places cleft-like ingrowths extended into the circular muscle bundles forming diverticula. The subserosa in this portion of the tube showed marked vascularity with numerous large and engorged capillaries almost presenting a picture of hemangiomatosis. The serosa was covered by a dense fibrillar connective tissue network in which were many thin-walled blood vessels and numerous cystic spaces of varying size that were lined by flat epithelium. These peritoneal cysts were free from blood and in several areas they opened as channels through the superficial muscle fibers of the tube and the deepest portions formed small nodules made up of the same type, but slightly expanded peritoneal cell. These nodules and cysts as described by Ries in 1896 in no way simulate dilated endometrial spaces such as has been so frequently described in endometrial implants. *Serial sections of the posterior surface of the uterus including the area where the uterus was adherent to the anterior wall of the rectum, demonstrate a thin outer layer of erythrocytes below the flat peritoneal cells and in this thin stratum were a moderate number of engorged capillaries. The ad-*

hesions seen on gross examination were, for the most part, composed of markedly hyalinized connective tissue, in the meshes of which were numerous engorged thin-walled blood vessels and free, well-preserved erythrocytes enmeshed in the fibrillar connective tissue strands. In no place could any epithelial cells be found and above all certainly no structure that could be regarded as endometrial elements.

COMMENT

To consider the possible cause or causes of stenosis of the cervix in this case involves considerable theoretical discussion when we take into account that the specimen represents a process that has been going on for a period of six months following the plastic operation on the cervix. Nevertheless, several facts are evident from the hospital records. We do know that the patient's postoperative course was characterized by a high temperature and a bloody, purulent discharge from the vagina. In the absence of any other findings to account for the temperature, sweats and abdominal pain the most likely focus would be in the cervix of the uterus. It is possible that the newly formed os may have been sutured partially or completely shut. The records do not state that a probe was introduced at the end of the operation to test the patency of the canal. That complete occlusion of the cervical canal did not occur is evident in that she bled from the vagina on several instances following the operation. Her menstrual irregularity after the operation is more logically explained by her menopausal-age rather than any mechanical factor produced by the condition.

In most cases of hematometra the distention by blood involves the entire uterus but in this specimen the cervix alone was the part involved. Of course, if the hysterectomy had been performed at a later date then the body of the uterus would probably have been involved. The mechanical factors, as to why the cervix was the only part involved, are of interest in this particular case. The local devitalizing effect of an operative procedure with sloughing of cervical tissue and placing of deep sutures, to control possible bleeding, would naturally offer relatively little resistance to the intracervical pressure if the outlet or os was closed by organizing blood or granulation tissue or if the os had been sutured shut. The five weeks after the operation, during which time the patient did not menstruate, would be adequate time for this occluding process to take place. The body of the uterus was not involved in the dilatation not alone because of the time element but also the firm, fibromuscular thick wall of the uterus offered greater resistance than the small remaining and less resistant cervical portion. Microscopic examination of the dilated cervix revealed no underlying pathologic condition, such as carcinoma, that would tend to make its wall still weaker.

The findings in this case indicate that reflux of blood and epithelial structures took place from the endometrium into the uterine and cervical

cavities, into the tubes, and into the free abdominal cavity. Realizing that the bleeding and desquamation of the epithelium could have been from the tube rather than from the endometrium, most of the evidence tends to bear out the regurgitation theory. First, the blood in the cervical and uterine cavities, in the tubes, and on the peritoneum was typically menstrual blood. Second, the finding of epithelial structures in the cervical blood, lining the uterine cavity, and in the lumen of the tube that corresponded, histologically, to sloughed off endometrium indicates as the source, the uterus rather than the tubal wall.

If Sampson's theory of regurgitation of blood is applied to this case, the specimen is an ideal one as far as the findings regarding the possibility of reflux of blood are concerned, whether the free epithelium in the lumen of the tube is regarded as uterine or as metaplastic epithelium of the tubal wall. So far, the theory is supported by the specimen. Beyond this, though, the findings demonstrate an opportunity for pelvic endometrial implants. Nevertheless the second half of the theory finds no support. However, several other factors have to be considered as to why endometrial tissue was not found on careful examination, in the specimens that were obtained. Although the epithelium in the uterus, cervix, and tube was histologically healthy it does not follow, that functionally, it was normal. If it did lodge on the pelvic peritoneum it may have been so old that it could not grow on a relatively infertile tissue such as the peritoncum. Also, the finding of epithelium in the locations described does not necessarily mean that the same structures also gained access to the pelvic peritoneum. We can only assume that implantation should have occurred especially when we consider that the process has been repeatedly described under less ideal conditions. Another possible reason as to why implantation did not happen is that the time after the operation was relatively short and if the obstruction would have been permitted to go on for a longer period of time there would have been opportunity for more tissue to have lodged on the peritoneum thereby increasing the chances of at least some of the pieces growing, and carrying on their cyclic changes. Lastly, in a woman fifty-one years of age the question of inadequate hormonal stimulation for the growth of this epithelium may have considerable bearing upon the viability of the misplaced cells.

From the standpoint of treatment the case elicits many possibilities regarding the prevention and active therapy of stenosis of the cervix uteri, hematometra, and hematosalpinx. If the causative factors mentioned in the first part of the article are kept in mind the cervical canal can be kept open by periodic dilatation during the period of granulation and connective tissue proliferation and contraction. After a plastic operation on the cervix, of course, the patency of the canal should be tested with a probe, if there is any doubt as to its patency. That cau-

terization of the cervix will lead to many strictures is hardly to be expected, particularly if periodic cervical patency tests are done. In addition the canal itself is not burned extensively by most general practitioners. Moreover, fewer amputations will be done thus eliminating a good percentage of the postoperative strictures. To prevent stenosis following operation, accurate coaptation of the proper edges should be as carefully done as in surgery of any other part of the body, and the same principles hold regarding the position and the proper tightness of the sutures in order to have as little sloughing and devitalization of tissues as is possible. The occurrence of stricture, as in this case, should be suspected earlier than six months after operation in order that the most conservative procedure can be carried out before extensive secondary changes have taken place.

In former years surgical opening of the occluded cervix was regarded as dangerous because of the possibility of extensive infection in the fertile blood media of the uterus and the fallopian tubes. Today, in spite of more aseptic surgery, and the risk of carrying infection by surgical interference must be kept constantly in mind and in addition exceptional preoperative antiseptic measures should be resorted to in order to avoid introducing infection into this blood filled tract.

If bimanual examination elicits the presence of hematosalpinx, the possibility of an internal hemorrhage must be considered, since the sudden collapse of the uterus after blood has been released into the vagina may tear the blood distended and friable tubes.

In a patient the age of the one here reported and in whom the question of a carcinoma of the remaining portion of the cervix cannot be ruled out a complete hysterectomy offers the easiest and most certain way out of the difficulty.

If it is desired to preserve the uterus, then we are presented with the problem of preventing infection in the retained blood, opening the strictured portion of the cervical canal, keeping it open, and restoring the involved structures to as near a normal state as possible. If simple perforation at the suspected site of the os does not lead to the cervical canal, then it may be necessary to split the anterior lip of the cervix in its longitudinal axis until the cervical canal is reached, and then amputate the cervix at this level.

Failure to open the cervical canal from the vagina is adequate reason to perform a laparotomy. The methods usually resorted to have consisted in doing a hysterotomy and then attempting to pass a probe or dilator from above into the vagina. Also, the entire length of the anterior surface of the cervix may be exposed, incised transversely until the cervical canal is reached, and at this point an attempt made to pass a probe by way of the vagina through the external os to the transverse incision. Another probe may then be inserted through the hysterotomy

opening, through the internal os, and then out of the incision in the cervix, thus creating a continuous channel that can be dilated and packed with gauze.

Stomatoplastic operations may be required for hematosalpinx if the structures are to return to as normal a state as is possible.

Gellhorn reported one case of hematometra in a woman beyond the menopause following radium treatment for carcinoma of the cervix that returned to normal after seven intramuscular injections of milk.

CONCLUSIONS

1. The study of a case of postoperative stenosis of the cervix uteri with hematometra confined to the cervix is presented.

2. The finding of free menstrual-like blood and endometrium in the cervix, corpus uteri, and the fallopian tubes confirms Sampson's theory of the regurgitation of menstrual blood.

3. Although free blood was present in the abdominal cavity, there were no evidences of endometrial transplants or growths on the structures removed by complete hysterectomy and left salpingectomy.

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NEPHRITIS IN PREGNANCY*

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OF THE various forms of toxemia appearing during the latter part of gestation, eclampsia has undoubtedly received the most attention, study, and speculation. This is not to be wondered at, as the mystery surrounding its etiology and the contradictory methods proposed for its treatment are intriguing. As a consequence, the other forms of toxemia, low reserve kidney, preeclampsia, and nephritis, have been somewhat neglected. This is particularly true in the case of nephritis complicating pregnancy. By many, nephritis is regarded as of lesser importance than eclampsia or even preeclampsia.

It is perhaps advisable that I state here what is understood by the term "nephritis complicating pregnancy." By it we mean that the patient, now pregnant, has a nephritis which may have been the outcome of some infection, such as tonsillitis, of an infectious disease, such as scarlet fever, or of some other condition, perhaps even repeated pregnancies, which resulted in permanent renal damage. In other words, the term implies a pregnancy superimposed on, or in the face of, permanently damaged kidneys, usually in the form of a chronic nephritis. This condition is absolutely distinct and different from low reserve kidney or eclampsia and preeclampsia. The kidneys are not damaged in "low reserve kidney" nor in eclampsia and preeclampsia.

What has confused many writers is that eclampsia may result in damaged kidneys, just as we see in certain cases of scarlet fever. A study of kidney function in a large series of eclamptic patients has convinced me that eclampsia, and therefore also preeclampsia, occur in patients with normal kidneys many times more frequently than in patients suffering from any form of nephritis. Nephritis plays no rôle in the etiology of eclampsia. In about one-fifth of eclamptic patients, the kidneys may become permanently damaged as a result of the eclampsia, just as they may in scarlet fever; but we do not suppose for a moment that the nephritis is an etiologic factor in the production of scarlet fever; nor should we, therefore, do so in the case of eclampsia.

Low reserve kidney does not eventuate in damaged kidneys or chronic nephritis. I have elsewhere shown that it is a very mild form of toxemia, which always clears up with proper rest in bed and diet or with delivery. In this type of toxemia, the kidney function as shown by renal function tests, is not decreased below the lower limits of normal.

*Read before the Obstetrical Society of Philadelphia, February 2, 1933.

It can be clearly seen then that low reserve kidney, eclampsia and pre-eclampsia (which is only a forerunner of eclampsia and is liable to eventuate in eclampsia) are very distinct entities from nephritis. Furthermore, nephritis, in any form, plays no rôle in the production or causation of low reserve kidney or eclampsia and preeclampsia.

In our annual maternal mortality statistics, it is usually stated that infection, hemorrhage, and toxemia are the main contributing factors, while eclampsia is given as the most serious type of toxemia concerned, due to its high accompanying maternal and fetal mortality. Such statistics do not represent the true state of affairs, in that only the deaths during and immediately following pregnancy are considered; and even then the victims of nephritis often outnumber those of eclampsia. Should our annual statistics include a ten-year mortality figure, nephritis would, in my opinion, be the second greatest factor in this death rate, being surpassed only by infection.

That we have every reason to believe in this prediction is indicated by a recent follow-up study of a large series of pregnant patients in whom the diagnosis of nephritis was established.¹ This study extended over a ten-year period following the first intimation of nephritis in each patient. Over 40 per cent of these women died within ten years following the definite recognition of nephritis during their pregnant state. Although nephritis, according to the vital statistics of the United States for the year 1931, was the second largest cause of death, the ten-year mortality rate for women, during the ages of eighteen to forty, suffering from some or other form of nephritis uncomplicated at any time by pregnancy, is decidedly below 40 per cent, according to the best insurance company and medical statistics. Pregnancy itself, therefore, hastens death and increases its rate in women suffering from renal disease. Furthermore, it may even be that pregnancy itself plays an etiologic rôle in certain of the nephritides. We come to the conclusion that pregnancy and nephritis constitute a most formidable alliance, and one which results in many early and unsuspected deaths, which are often not known to the obstetrician.

It is, therefore, apparent that nephritis, in a woman who is pregnant, must be recognized as early as possible and the proper treatment or procedure instituted, if we are to materially lower this ten-year maternal mortality rate of 40 per cent incident to "nephritis complicating pregnancy." The diagnosis of chronic nephritis is not always easy nor even possible at a certain stage of the disease. Where the diagnosis is exceedingly simple, the process is often beyond help or repair and the patient is doomed. It is in the milder or earlier forms of the disease that proper treatment may greatly prolong life; and so my plea is for early recognition of the disease and correct treatment.

How then shall we know that the patient is suffering from a mild chronic nephritis? Fortunately, the disease is usually accompanied by

a hypertension and an albuminuria, which should serve as indications for detailed observation and study. In the prenatal care it is our duty to study every woman who shows a blood pressure of 140/90 or higher, with or without albuminuria, with an aim to conclusively rule out or establish the diagnosis of nephritis. This can often not be done unless the patient is admitted to a hospital where adequate kidney function studies may be carried out.

There are many aids in the diagnosis, and often it takes several of these to show us the right path. A careful perusal of the patient's past history, especially where there have been previous pregnancies, the presence or absence of symptoms, such as headache, dizziness, or visual disturbances, the presence or absence of edema and the response of the patient to rest in bed and proper diet, are all essential steps in such a study. Often a simple ophthalmologic examination of the eyegrounds clears up a confusion in this study.

It is usually necessary to admit the patient to the hospital in order that a correct diagnosis may be established. Our procedure is to put the patient on a low protein, soft diet and to plot daily the systolic and diastolic blood pressures, as well as the amount of albuminuria. This is continued for a period of about two weeks, and during this time the blood chemistry and renal function are carefully investigated. In the milder forms of chronic nephritis, the blood chemistry will usually reveal nothing abnormal. In the severer forms, a beginning nitrogenous retention is often present, as evidenced by a nonprotein nitrogen content of about 40 mg. or more in 100 c.c. of blood. Such a mild retention of nitrogen in the blood stream is usually pathognomonic of chronic nephritis. The only other types of toxemia in which we may see an increase in the nonprotein nitrogen are vomiting of pregnancy with marked dehydration and consequently concentration of the blood, and in the later stages of certain cases of eclampsia where the so-called eclamptic "toxin," whatever that may be, in other words, the disease itself, has produced injury to the kidneys with resulting nitrogenous retention. But in the case of a woman in the last three months of pregnancy who is suffering from a hypertension and albuminuria and who, in addition, reveals nitrogenous retention in the blood stream, one can be fairly sure that one is dealing with chronic nephritis. In low reserve kidney and in preeclampsia, we do not have an increase above normal in the nonprotein nitrogen of the blood nor in the urea nitrogen. The outstanding feature then, as far as the blood chemistry is concerned, in cases of chronic nephritis, is that the majority of the patients show no abnormality, while a certain number reveal nitrogenous retention, and in these, the diagnosis can almost be established on the basis of the blood chemistry.

A study of the renal function tests is most essential in the differential diagnosis between chronic nephritis, low reserve kidney, and eclampsia.

The renal function in the latter two forms is normal, while in chronic nephritis, a decreased kidney function will be found if we are patient and persistent enough in studying the patient. A single renal function test is of no value. It is often necessary to do three or four types of kidney function tests and to repeat these two or three times. We are, at present, employing three kidney function tests routinely on all patients in whom we suspect chronic nephritis. These are: the fifteen-minute phenolsulphonephthalein, the creatinine excretion, and the urea clearance tests. It is often seen that two of these tests may be normal, while one shows decreased function. In the more severe cases, all three tests may reveal lowered renal function. There is some doubt as to whether the creatinine excretion test is a true index of glomerular function, and it may be that this test actually measures tubular function.² I am convinced, however, that the fifteen-minute phenolsulphonephthalein test and the urea clearance test are of the greatest help in establishing a diagnosis.³ I may say that whereas we have usually regarded a urea clearance of below 70 per cent of the normal as an index of nephritis or damaged kidneys, our ideas have recently been slightly revised as the result of the publication by Mosenthal.⁴ Any urea clearance which gives values below 50 per cent is very strong proof of the existence of a chronic nephritis. A urea clearance above 50 per cent does not necessarily mean that the patient does not have chronic nephritis, and in these cases it is necessary to study the patient further and to repeat the kidney function tests in order to be absolutely sure that we are dealing with a nonnephritic type of toxemia. The phenolsulphonephthalein test, plotted on a fifteen-minute excretion basis, is perhaps not so sensitive as the urea clearance, but it is often of great help in establishing a definite diagnosis. A repeatedly low phenolsulphonephthalein excretion test is sure evidence of damaged kidneys. The details of these two tests, on which we depend so greatly, are as follows, according to our routine procedures:

I. Phenolsulphonephthalein Test.—

1. Patient has a rubber catheter inserted and bladder emptied. Leave catheter in for all of the test if used.
 - a. Fasten catheter to patient's leg with adhesive to hold in place.
 - b. Use Kelly clamp to clamp off catheter.
2. Empty bladder. Patient now drinks 200 c.c. of water.
3. 6 mg. of phenolsulphonephthalein is given intravenously by the doctor. Time ordered by the doctor.
4. 15 minutes after the intravenous injection is given by the doctor, the first specimen is obtained. Send all of the specimen to the Laboratory, marking bottles properly. Patient now drinks 100 c.c. of water.
5. 15 minutes later second specimen collected. Entire specimen is sent to Laboratory, properly labeled. Patient now drinks 100 c.c. of water.
6. 15 minutes later third specimen is collected. The entire specimen, properly labeled, is sent to Laboratory. Patient now drinks 100 c.c. of water.

7. 15 minutes later fourth specimen is collected. Entire specimen, properly labeled, is sent to Laboratory. Patient now drinks 100 c.c. of water.
8. 15 minutes later fifth specimen is collected. Entire specimen, properly labeled, is sent to Laboratory.
9. 15 minutes later sixth specimen is collected. Entire specimen, properly labeled, is sent to Laboratory.
10. 15 minutes later seventh specimen is collected. Entire specimen, properly labeled, is sent to Laboratory.
11. 15 minutes later eighth specimen is collected. Entire specimen, properly labeled, is sent to Laboratory.

II. Urea Clearance Test.—

1. 6 A.M. awaken patient. Regular breakfast, except tea, coffee, or cocoa. See that patient stays awake.
2. 7 A.M. patient voids, specimen discarded. Patient may have 200 c.c. of water.
3. 8 A.M. patient voids, entire specimen is to be sent to Laboratory. Patient may have 200 c.c. of water.
4. 8:30 A.M. Blood drawn by the doctor. Doctor to fill in label and mark bottle or tube.
5. 9 A.M. patient voids, entire specimen is to be sent to Laboratory. Patient may have 200 c.c. of water.
6. Patient may have food.

Points to be emphasized are that, before beginning the phenolsulphonaphthalein test, one should be sure that all bottles are properly labeled with the number of the specimen, first, second, third, fourth, fifth, sixth, seventh, and eighth, and the correct time collected. We have found this very essential to the correct conductance of the test. It is also well to check with the doctor to see if he wishes the patient to have a catheter inserted or to have all specimens voided. The patient may have food during the test.

The third test on which we place reliance, although to a somewhat lesser extent than on the other two outlined above, is the creatinine excretion devised by Major. In this test the patient is given one-half of a gram of creatinine intramuscularly and the rate of excretion observed. The details of the test, as carried out in the Woman's Clinic of the New York Hospital, are as follows:

1. 8:15 A.M. sharp. Breakfast is served from floor service.
2. 9:15 A.M. patient voids, specimen discarded. Patient may have 200 c.c. of water.
3. 10:15 A.M. patient voids, entire specimen is to be sent to Laboratory. At this time, $\frac{1}{2}$ gm. of creatinine is given by the doctor.
4. 11:15 A.M. patient voids, entire specimen sent to Laboratory. Patient may have 200 c.c. of water.
5. 12:15 patient voids, entire specimen is sent to Laboratory.

The results of the phenolsulphonaphthalein test are plotted on a curve as shown in Fig. 1. Decreased kidney function is readily observed as the patient's course does not follow the normal curve which is printed on all our kidney function charts.

The urea clearance is readily figured out by the formula:

$$C_m = \frac{U \times V}{B} \times 1.33$$

where C_m = Maximum clearance
 U = Urea nitrogen per 100 c.c. urine (either specimen)
 V = Volume of urine per minute
 B = Blood urea nitrogen per 100 c.c. blood.

The maximum clearance (C_m) is calculated when the amount of urine excreted is 2 c.c. or more per minute, and represents the percentage of

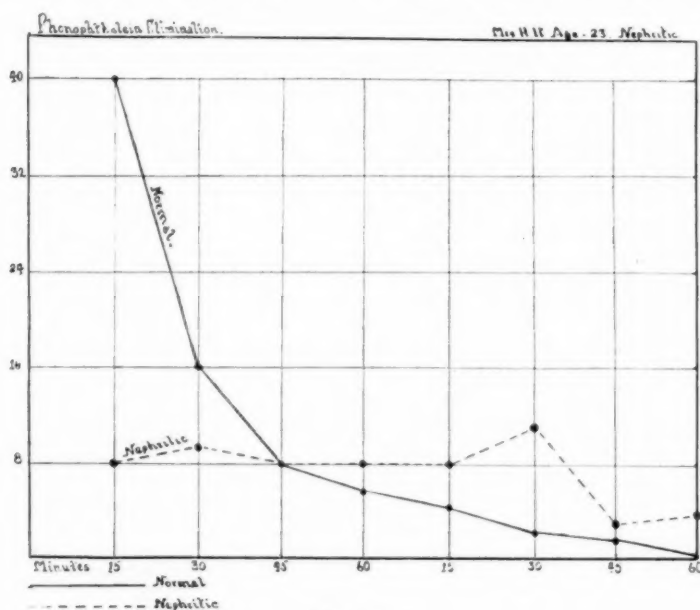


Fig. 1.

normal. When the urine excreted is less than 2 c.c. per minute, one calculates the standard clearance (C_s) according to the formula:

$$C_s = \frac{U \times \sqrt{V}}{B} \times 1.85$$

The standard clearance (C_s) is also expressed, according to the above formula, as a percentage of normal. The basis for the above formulas is that in one minute 75 c.c. of blood is normally cleared of urea by the kidneys when the amount of urine voided is 2 c.c. or more per minute, while 54 c.c. of blood is cleared if the rate of urine excretion is less than 2 c.c. per minute. The comparison of normal and decreased urea clearances is graphically shown in Fig. 3.

The basis of the creatinine excretion test is that the person with undamaged kidneys excretes during the first hour after the injection of $\frac{1}{2}$ gm. of creatinine three times or more creatinine than during the hour preceding the injection. The creatinine excretion curves for normal and nephritic patients are shown in Fig. 2.

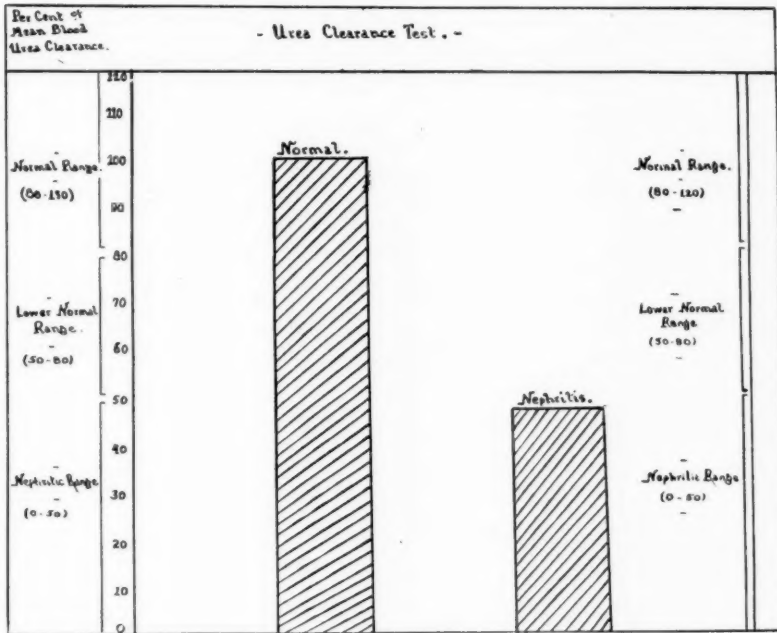


Fig. 2.

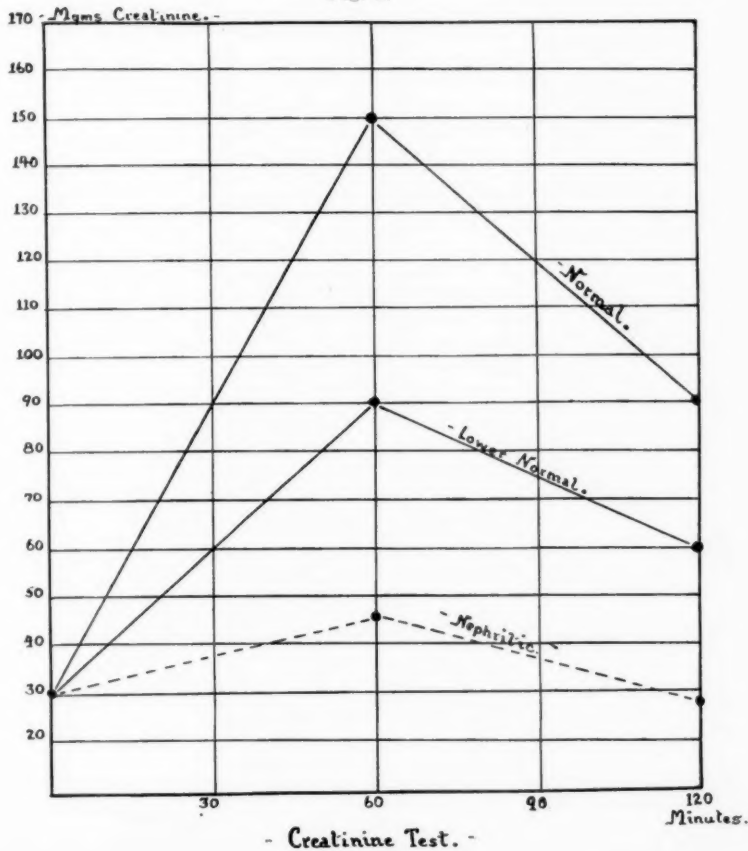


Fig. 3.

The Addis' cell count is of further value. My experience with cell count has been limited, and I am as yet not in a position to make any definite statement regarding this method of recognizing an underlying nephritis. The microscopic examination of the urine is not of great help in the average case in whom a differential diagnosis is difficult to establish.

The patient's past history, the hypertension, albuminuria, and edema and their response to rest in bed under proper dietary measures, the examination of the eyegrounds, the presence or absence of symptoms and their response to hospitalization, the repeated study of the blood and urine chemistry, the repeated study of at least two kidney function tests such as the fifteen-minute phenolsulphonaphthalein and the urea clearance, and the period of pregnancy when hypertension, albuminuria, and symptoms first appeared are the main factors in our differential diagnosis. If one studies these points carefully, and it usually takes two weeks to do so, there are very few cases indeed in whom one is unable to establish a diagnosis.

My views about the treatment of nephritis, as appearing during pregnancy, have undergone very radical changes. I used to advocate fairly conservative measures. Today I am more radical, and this change in my views is due to the results seen in the follow-up study to which I have referred earlier in this paper. In face of a maternal mortality of over 40 per cent, when this mortality is calculated on a ten-year basis, I feel that radical measures are indicated. In a patient in whom a definite diagnosis of chronic nephritis is firmly established, I do not hesitate to advocate termination of the pregnancy, taking into account, of course, all other factors which should be considered. We know that pregnancy as it proceeds toward term throws a greater and greater load on the kidneys and undoubtedly shortens the lives of patients with an underlying damaged renal condition. In such patients, termination of the pregnancy seems to be the procedure of choice. If the patient is near term and the child is living, I usually advocate cesarean section with sterilization, as experience with birth control procedures has taught me that we cannot depend very greatly on this measure of preventing future pregnancies. If the chronic nephritis is quite severe, I go so far as to advocate sterilization by hysterectomy rather than by tubal resection, as I feel that the involution of the uterus and the excretion of all its concomitant break-down products will throw a further load on the already damaged kidneys. It is, of course, necessary in such cases to obtain the consent of the patient, as there are women who wish to continue menstruation. It is not my practice to be as radical as this in all patients, as each case has to be studied individually, and I can outline here only my underlying principles in treatment. We feel convinced that chronic nephritis and pregnancy form an exceedingly serious combination, and wherever it is possible, the pregnancy should be terminated

as soon as is advisable in order that the chronic nephritis be not further aggravated and the patient's life thereby markedly shortened.

CONCLUSIONS

1. The prognosis in chronic nephritis complicated by pregnancy is grave, the average maternal mortality occurring within ten years being approximately 40 per cent.

2. It is our belief that the strain of pregnancy on kidney function greatly aggravates an underlying chronic nephritis, and thereby materially shortens the life of the individual.

3. To help in the early recognition of nephritis we advocate the employment of the urea clearance and fifteen-minute phenolsulphonethalein tests. The creatinine excretion test may also be employed, although it perhaps measures tubular instead of glomerular function.

4. In addition to these kidney function tests, the patient's past history, the duration of pregnancy, the behavior of the blood pressure, albuminuria, and edema under hospitalization with proper dietary measures, the examination of the eyegrounds, the cardiovascular system, and the findings in the blood and urine chemistry, are all aids in establishing a correct diagnosis.

5. The best treatment for chronic nephritis in a pregnant woman is the termination of the pregnancy and prevention of any further pregnancy.

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DISCUSSION

DR. J. O. ARNOLD.—Most of us will undoubtedly agree with almost all that Dr. Stander has said, though, perhaps, not all, especially on the matter of the radical conclusions as to treatment.

Like Dr. Stander, I, too, have definitely changed my views on this point, in the past three years, but my change has been in exactly the opposite direction. My experience with this class of cases in recent years, has given me reason, I believe, to be less radical than formerly. Until about three years ago, I unhesitatingly accepted and acted upon the conclusion that pregnancy should be prevented or terminated at an early date, in patients with known nephritis. I recall very well the last patient of this type, on whom I felt it advisable to do therapeutic abortion by abdominal hysterotomy and sterilization, at about the fifth month. That was something over three years ago, and while I have seen a number of such cases since, I have not felt it necessary or advisable to abort them, even in the presence of undoubted nephritis. This is chiefly because we think we have found a better method than we had previously known, for carrying these patients through pregnancy, in relative safety.

It is true, not all our patients in this time, have had the diagnosis of nephritis verified by the various laboratory studies and tests discussed by Dr. Stander, but clinically they were shown to have nephritis, and most of them had been subjected to what Dr. Stander has referred to as the best test of all—the test of pregnancy.

In a number of these patients, on whose cases we have based our reasons for a change of opinion as to treatment, there had been one or more previous pregnancies, with aggravation of the nephritis, and therapeutic abortion, once, twice, or oftener, and yet, in a subsequent pregnancy, we have taken these same women through to term, or near term, and given them living, healthy babies—which, in itself, has perhaps had no small part in counteracting some of the ill effects that might have been expected.

It becomes a question, I think, as to where, or upon what we shall place the evaluation of our results. For instance, I recall one of the earliest cases to be treated by our present methods, now more than three years ago. An unquestioned case of chronic nephritis, for which she had been treated for years, and then, in her pregnancies, three in succession, the marked aggravation of her disease seemed to warrant therapeutic abortion at or before the second trimester. In her fourth pregnancy, there was no serious trouble at all. But we had, to assist us, what her former attendants did not have, namely, a strong, compelling motive for her co-operation, an intense desire for motherhood, which enabled us to put definitely into practice, and to have faithfully followed, the methods we were beginning then to employ for the protection of this type of patient against the ill effects of pregnancy on the already damaged kidneys. Very definite application of fluid balance methods—short interval feedings, with good food, not excluding proteids—restriction of liquids, and dehydration to the extent of definite weight control—enabled us to carry this patient quite satisfactorily to the eighth month. We would not have the slightest fear now in carrying her to term, and then, being one of our first cases, we induced labor, but we gave her a living healthy child. She did not appear the worse for her one successful pregnancy, but lately, I have learned that she finally lapsed from the care of her physician, and died, presumably from her kidney disease.

Now, my point is this: on what shall we base our final values in this case, and others like it? This woman would perhaps have died even earlier, if she had not had a child to live for, for her disease was of a most serious nature. As it was, she had at least three years of satisfactory motherhood, and left a healthy child to take her place. Surely our final mortality was no higher, when we consider her living child, than it would have been, had we aborted and sterilized her in that fourth pregnancy.

Age has been referred to as an important factor. It has not seemed to us to make so much difference, if we can control the patient's food and drink. The woman just mentioned was twenty-three; in a more recent case, the patient was forty-three, and had been aborted twice, because of grave aggravation of her disease, each time requiring months to restore her to her usual health. In a third pregnancy, strict fluid balance observance carried her to spontaneous labor and delivery at term, of a living healthy child, and with no discoverable aggravation of her kidney disease, either during the pregnancy or in the year and a half she has been under observation since.

Another patient gave a history of scarlet fever and prolonged illness in late childhood, and in her first pregnancy had a most severe attack of eclampsia at the sixth month, for which her uterus was emptied. A second pregnancy ended in spontaneous abortion at the fifth month, because of her kidney disease, and again, in her third pregnancy, she had eclampsia with loss of her child, at about the seventh month. In a fourth pregnancy, on a fluid allowance almost unbelievably small—going for nearly four months with scarcely any gain in weight, she delivered spontaneously at term, and now has a healthy child more than a year old, and so far as her family physician can discover, there is no clinical evidence of detriment to her health.

The cases I have cited are but typical of many more in which the consistently good results from our present methods of combating the ill effects of pregnancy on damaged and decompensating kidneys, have led me to change my views on this point, and to become decidedly more optimistic as to results, than I could be from my former experience.

And even if there is evidence at the end of five or ten years, that our maternal mortality is higher than it would have been, had these women all been aborted, I submit that our total mortality, when we consider the children we have saved to the world, to take the place of these doomed mothers, will compare not unfavorably with the results shown by Dr. Stander's large series of cases.

DR. P. BROOKE BLAND.—In our Department covering a period of five years, from 1928 to 1932 inclusive, pregnancy toxemia, including simple nausea and all other types, was encountered in 1,543 patients. The great majority of the cases were, of course, of the simple type.

Of the more serious forms there were: 15 cases of hyperemesis, 1 case of acute yellow atrophy of the liver, 43 cases of low reserve kidney, 123 cases of pre-eclampsia, 16 cases of eclampsia, and 31 cases of nephritis.

Of the latter, one of the patients died, rendering a mortality somewhat in excess of 3 per cent. The immediate maternal mortality of nephritis complicating pregnancy, however, represents only a small fraction of the destructive action of the trouble.

Since practically all of our patients were multiparous women, with from three to fifteen children, it is quite likely that life expectancy has been shortened tremendously and that all, or nearly all, will ultimately succumb to the disease.

I believe that a passive policy as regards treatment will lead to still more serious damage and I am in hearty accord with Doctor Stander in advocating a more radical plan.

DR. BARTON C. HIRST.—It is not easy to agree that gestational toxemia and nephritis in pregnancy have nothing to do with one another, if I understood Dr. Stander's view correctly. Otherwise it would be impossible to explain why 5 per cent of nephritic subjects have eclampsia if they become pregnant while only 0.003 per cent of healthy women display this ultimate expression of gestational toxemia; or why at least a temporary nephritis is almost always a late accompaniment of toxemia. As a matter of fact the toxins from metabolism within the pregnant uterus going to the liver to be oxydized and then to the kidneys to be excreted, cannot be got rid of if the kidney function is impaired, so nephritis is necessarily a predisposing cause of toxemia in pregnancy. A therapeutic abortion in these women must always be considered. I have frequently sterilized them at the same time but it is not always necessary. Contraceptives can often be relied on. If, however, sterilization is desired, I should decidedly object to the unnecessarily radical procedure of hysterectomy. The same result can be attained without mutilation and without the cessation of menstruation, an important consideration in most women. I know of four of my patients at the present moment who are insane from brooding over a mutilation that in their case was unavoidable, and recently I had the unpleasant news that one of them had hung herself.

DR. ABRAHAM CANTAROW.—We have been studying the urea clearance test in pregnancy on Dr. Bland's service at Jefferson and find certain very distinct differences between results obtained in pregnant and in nonpregnant individuals. The concept of blood urea clearance as a mathematical expression of renal functional activity is based upon certain physiologic factors which determine the rate of elimination of urea from the blood under conditions of normal metabolism and blood flow in the nonpregnant state. It seems obvious that alterations in these factors

may occur during pregnancy in view of the profound changes in total metabolism, protein metabolism and circulation which are associated with that state. Because the magnitude of these changes increases progressively throughout the period of gestation, it would appear probable that their effect upon urea elimination should become more marked in the later months of pregnancy.

We are of the opinion, supported by our studies of normal pregnant women, that the end-result of these physiologic changes is a diminution in the blood urea clearance values as calculated on the basis of formulas which represent normal conditions in the nonpregnant state. We believe that the value of the urea clearance test as an accurate index of renal functional efficiency diminishes as the period of gestation lengthens. Subnormal values obtained during the last two months of pregnancy must be interpreted with extreme caution, particularly in the absence of clinical or other laboratory evidence of renal functional impairment.

DR. ROBERT A. KIMBROUGH, JR.—On Dr. Piper's service at the Philadelphia Lying-In Hospital is a special clinic for the study of toxemia in which we are careful in our attempts to differentiate between true toxemia and nephritis complicating pregnancy. We have found the urea clearance test to be the most accurate laboratory index of the degree of renal damage. We feel, however, that certain clinical considerations are of even greater importance in establishing the diagnosis of chronic nephritis. The appearance of hypertension during the first half of pregnancy and its failure to subside within six weeks after delivery strongly indicate the existence of kidney damage.

DR. STANDER (closing).—I sometimes wonder if it would not be a good thing if we could discard the term "toxemia." It is so confusing. Some include nephritis and others do not. We cover a multitude of sins with this term "toxemia of pregnancy."

To answer the question of urea clearance in women who are pregnant and close to term; this has been a disturbing factor to us and I cannot answer at present. The early appearance of signs and symptoms in pregnancy is most important. You find no patient with signs and symptoms of toxemia, that is, a hypertension, albuminuria, headache, etc., during the first half of pregnancy, who has not chronic nephritis. If a woman is only three months pregnant, and she has those symptoms which we call toxemia, you can be almost sure that you are dealing, not with pre-eclampsia or eclampsia, but with chronic nephritis.

I do not disagree with Dr. Hirst in his statements. It is only a difference in definition. I tried to separate any confusion in the etiology. To my way of thinking the kidney has nothing to do with the etiology of eclampsia, as I have seen many patients with eclampsia with no symptoms of nephritis and absolutely normal kidneys.

THE VALUE OF THE ASCHHEIM-ZONDEK REACTION IN THE DIAGNOSIS AND PROGNOSIS OF CHORIONEPITHELIOMA*

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CHORIONEPITHELIOMA is a relatively rare disease, usually presenting diagnostic difficulties until unmistakable symptoms of metastasis, either local or distant, appear. When the condition develops before the expulsion of the products of conception, as in the case reported by Schmitz¹ wherein renal hematuria due to metastasis preceded termination of pregnancy by three months, a definite diagnosis is impossible without microscopic examination of the metastatic tissue.

Even the usual case of chorionepithelioma, characterized in its early stage by abnormal uterine bleeding a month or two after the expulsion of the products of conception, is difficult to diagnose by microscopic examination of uterine scrapings, because the chorionic epithelium is normally a proliferative and invasive tissue showing a tendency to persist and penetrate to a considerable depth into the uterine musculature. This is especially marked when the syncytial covering proliferates for no accountable reason and forms polypoid processes which invade the surrounding tissue and lodge in the uterine and even in distant veins (Schmorl²). The layer of Langhans is also prone to proliferate in the course of normal or mole pregnancy, break through the surrounding syncytial covering and invade the uterine musculature.

The inadequacy of uterine curettage in the diagnosis of chorionepithelioma is clearly illustrated by the two case histories herein recorded. Though the absence of fragments of chorionic villi and the presence of anaplasia in trophoblastic tissue recovered a month or two after termination of pregnancy are strongly suggestive of chorionepithelioma, a definite diagnosis cannot be made on the strength of these findings alone because they do not show the extent of invasion and necrosis of the myometrium.

In reporting these two cases of chorionepithelioma, the authors hope to emphasize by contrast the value of the Aschheim-Zondek test in the early diagnosis and prognosis of chorionepithelioma and to stress the irreparable damage that may result from intrauterine application of radium in suspected cases through masking pelvic symptoms which

*Read at a meeting of the Obstetrical Society of Philadelphia, January 5, 1933.

call for more drastic measures. It is not, however, our intention to dispute the value of irradiation in women afflicted with chorionepithelioma who are physically unfit for panhysterectomy or in those showing extensive vaginal metastasis. Two such cases treated by irradiation alone with good results were recently reported by Schmitz.¹ Keene³ likewise followed up for a period of fifteen years two women who were treated by means of radium for vaginal metastases; both are thus far living and well. These favorable results with intensive irradiation therapy alone warrant the conclusion that routine post-operative irradiation may lessen the incidence of recurrence of chorionepithelioma and that metastatic tumors of the lungs and liver may possibly respond to intensive irradiation therapy.

CASE 1.—J. T., aged thirty-six, para iii, was admitted to the Mt. Sinai Hospital on May 26, 1932, complaining of uterine bleeding and lower abdominal pain of two weeks' duration, following a missed period.

She began to menstruate at sixteen and continued at intervals of seven to eight weeks until the onset of her present illness. During July, 1930, she was admitted to the wards of the University Hospital for profuse uterine bleeding. She was then about four months pregnant. A rather large hydatidiform mole was removed with placental forceps. She was readmitted to the University Hospital on Oct. 11, 1930, because of continued bleeding. A uterine curettage recovered insufficient tissue for diagnosis; the fragments recovered showed no evidence of chorionepithelioma.

The uterine bleeding continued at irregular intervals until December, 1930, when a diagnostic curettage was again performed and 600 mg. hours of radium applied at the American Stomach Hospital.

For the following eighteen months she menstruated, as was her habit, at intervals of seven to eight weeks until her admission to the Mt. Sinai Hospital.

Findings.—Preoperative physical examination of her chest failed to reveal the condition later discovered through x-ray studies. Her uterus was somewhat soft, only slightly enlarged and freely movable. There was a palpable, small, tender mass in the left uterine horn; otherwise, the pelvis was negative. Her blood count, blood chemistry, and Wassermann test were also negative. The sedimentation test, however, showed a sharp decline. Her temperature and pulse rate were normal. The rabbit test was positive for pregnancy. On the strength of these findings, a diagnosis of interstitial tubal pregnancy was made.

At operation part of the small intestine was found adherent to the left uterine horn which was thickened and infiltrated. The uterus, as a whole, was somewhat enlarged and congested. The fallopian tubes and ovaries appeared normal. Believing that the patient had a perforation of the left uterine horn as a result of a criminal abortion, a supravaginal hysterectomy and a left-sided salpingo-oophorectomy were performed. The right tube and ovary were left in situ; the appendix was removed.

Section of the removed uterus showed that the upper left part of the organ was replaced by a soft, friable, adenomatous tissue which penetrated the entire thickness of the uterine wall. The endometrium in other parts appeared fairly normal. Microscopically, unmistakable evidence of chorionepithelioma was present. The removed ovary, which was not enlarged, showed one well-developed corpus luteum, numerous atretic follicles and areas of hemorrhage into the stroma. There was no evidence of hyperluteinization.

Roentgen ray study of the lungs a few days after operation showed two large nodules, one measuring $3\frac{1}{2}$ cm. and the other $2\frac{1}{2}$ cm. in diameter, in the upper lobe of the left lung. Repetition of the Aschheim-Zondek test showed that as little as 1 c.c. of her urine evoked a very strong reaction. The stimulated rabbit ovaries resembled a diminutive bunch of grapes. The patient was subjected to intensive x-ray treatment of the affected lung and pelvis, and had an uneventful post-operative convalescence.

With the gradual decrease in the size of the metastatic tumors, probably as a result of continued irradiation treatment, there is a corresponding decrease in excretion of prolan so that now, after a lapse of six months, 20 c.c. of her urine evoke no more than the ordinary pregnancy reaction in the isolated rabbit. X-ray study of her lungs on Dec. 12, 1932, showed complete disappearance of one nodule and a decrease in size of the other to half its original size.

CASE 2.—G. P., aged forty-four, a mother of three children, was admitted to the wards of the Mt. Sinai Hospital on December 2, 1927, for the treatment of intermenstrual staining of three months' duration. The abnormal uterine bleeding appeared two months after an early abortion for which she was treated at her home by her family physician. Examination of her chest revealed nothing abnormal. Pelvic examination showed a somewhat thickened, easily bleeding cervix and a moderate rectocele. Otherwise the generative organs were found to be normal. Her blood count, blood chemistry, and Wassermann test were negative.

Fundal or cervical malignancy, chorionepithelioma and preclimacteric functional uterine bleeding were the possibilities considered, hence endometrial and cervical tissues were obtained for examination and 50 mg. of radium implanted into the uterine cavity for twenty-four hours. Dr. Davidsohn reported on the microscopic findings of the tissues as follows: "There is no evidence of malignancy in the cervical tissue. The bulk of the scrapings is clotted blood. The little endometrium present is of the interval type. One area, however, consisting mainly of fibrous and muscle tissue, shows a large number of cells with huge dark-staining nuclei; others have the appearance of syncytium: There is no evidence of anaplasia or necrosis."

In view of these suggestive microscopic findings, the woman was followed up carefully for a period of six months, during which time she enjoyed good health. On Sept. 7, 1928, approximately ten months after her discharge from the hospital, she was readmitted on the medical service with a slight elevation of temperature, hematuria, and hemoptysis of two weeks' duration. Vaginal examination revealed extensive metastasis in the anterior and left lateral vaginal walls. At no time since the application of radium did she have vaginal bleeding. Roentgen ray studies of the chest showed a small nodule in the base of the right lung.

The hemoptysis, loss of weight and toxicity gradually increased until her death on Oct. 20, 1928, six weeks after her second admission to the hospital. Autopsy revealed metastasis of the lungs, liver, and kidneys. Unfortunately, the pituitary changes in this case were not ascertained because we had no permission to open the skull.

The significance of the Aschheim-Zondek reaction in the diagnosis of chorionepithelioma was not known at the time of this patient's illness. Had she been studied by means of this test, an early hysterectomy might have stayed the progress of the disease.

Comment.—In the first case, herein recorded, two diagnostic curettements, at an interval of four months, failed to reveal the true state of affairs, thus stressing the unreliability of the procedure in the early diagnosis of the disease.

In both patients the intrauterine application of 600 and 1200 mg. hours of radium, respectively, not only failed to arrest the progress of the disease but tended to mask the local symptoms until metastases in the lungs appeared. This leads us to the conclusion that abnormal uterine bleeding occurring within a few months after a normal or mole pregnancy should not be treated by irradiation on the assumption that the bleeding is of the so-called functional type. If the curette recovers fragments of chorionic villi, there is no immediate need of further treatment. If, however, the scrapings show chorionic epithelium without a connective tissue core, the presence of chorionepithelioma, even in the absence of continued uterine bleeding, is strongly suggestive. In such cases, repeated quantitative Aschheim-Zondek tests are of inestimable value in guiding our future course.

As shown in the history of the first patient, regression of the metastatic lung tumor is accompanied by a corresponding decrease in the amount of the anterior pituitary-like substance in the morning specimen of urine, showing a quantitative relationship between the production of the hormone and the size of the tumor mass.

THE ASCHHEIM-ZONDEK REACTION IN CHORIONEPITHELIOMA

In 1929, Fels⁴ and Rössler⁵ observed that women suffering from hydatidiform mole or chorionepithelioma excrete many times more of the hormone than normally pregnant women and that quantitative estimation of the hormone excreted is an accurate guide in differentiating hydatidiform mole from uterine bleeding in the course of pregnancy due to other causes. Further observations led them to the conclusion that the presence of increasing quantities of the hormone two weeks after termination of normal pregnancy or eight weeks after a mole pregnancy is pathognomonic of chorionepithelioma and that after complete removal of the growth the persistence of appreciable quantities of the hormone in the urine is indicative of metastasis. This discovery placed at our disposal one of the most valuable diagnostic and prognostic laboratory procedures in the management of chorionepithelioma.

Since then, numerous authentic reports of the value of the Aschheim-Zondek reaction in the diagnosis and prognosis of this disease have appeared in the literature. Schultze-Rhonhof⁶ reported three cases of chorionepithelioma in which the Aschheim-Zondek reaction promptly disappeared after the removal of the growths. Fahlbusch⁷ places so much reliance on the test that in one instance he desisted from operating on a bleeding woman despite the diagnosis of chorionepithelioma from curettements, because the Aschheim-Zondek reaction was repeatedly negative. Subsequent history of the case proved that he was right. Mack⁸ studied two women after operation for chorionepithelioma by means of the Aschheim-Zondek reaction. One of the

two in whom the test became negative is well; in the other, the persistence of a strong positive reaction after operation antedated the development of metastatic nodules in the vagina.

Thus far, approximately fifty cases of chorionepithelioma studied by means of the Aschheim-Zondek reaction have been reported in the literature. All of these show the value of the test in the diagnosis and prognosis of hydatidiform mole and chorionepithelioma.

According to Ehrhardt⁹ and others, the concentration of the anterior pituitary-like hormone, prolan, in the urine of women suffering from hydatidiform mole is sufficient to render a reaction in the infantile mouse with as little as 1/520 c.c. of urine. He demonstrated the presence of 100 mouse units of the hormone per cubic centimeter of urine in a case of chorionepithelioma. Robert Myer (cited by Ehrhardt⁹) likewise recovered 70 mouse units of the hormone per cubic centimeter of urine in a case of testicular chorionepithelioma. In contrast to these high values, the urine of normally pregnant women never yields more than 5 mouse units of the hormone per cubic centimeter.

The importance of evaluating *quantitatively* a persistent Aschheim-Zondek reaction after the expulsion or operative removal of a hydatidiform mole is well illustrated in the history of a woman previously reported by one of us (Mazer¹⁰). On the strength of a persistent qualitative Aschheim-Zondek reaction, a diagnosis of chorionepithelioma was made and a hysterectomy recommended by a competent gynecologist, one month after the expulsion of a hydatidiform mole. Repeated Aschheim-Zondek tests by the fractional method showed decreasing quantities of the hormone, on the strength of which we advised against an operation despite temporary abnormal uterine bleeding. The woman spontaneously ceased to bleed and later conceived and was delivered of a healthy child.

It must, therefore, be remembered that the Aschheim-Zondek reaction may persist for two months or longer after the expulsion or operative removal of a hydatidiform mole, and that in resorting to the Aschheim-Zondek test in suspected cases of chorionepithelioma, *quantitative differences* are most important. The presence of increasing quantities of the hormone is pathognomonic of this disease.

THE PITUITARY AND OVARIAN CHANGES IN CHORIONEPITHELIOMA AND THEIR RELATION TO THE PLACENTAL HORMONE, PROLAN

With the advent of our recent knowledge in sex physiology and our appreciation of the pivotal rôle of the anterior pituitary lobe in the sexual and gestational cycles, interest was naturally centered on the histology of the anterior pituitary lobe of women suffering from chorionepithelioma.

The pituitary changes occurring in the course of normal pregnancy were fully described by Erdheim and Stumme¹¹ as early as 1909. In

1929, Rössler⁵ described a somewhat atypical pituitary pregnancy reaction in a woman who had died of metastatic chorionepithelioma eighteen months after extirpation of the initial lesion. Her urine persistently yielded positive Aschheim-Zondek reactions. In the case of chorionepithelioma reported by Novak and Koff¹² a year later, typical pituitary changes of pregnancy were found, namely, the transformation of the chromophobes into large cells with clear and somewhat irregular nuclei and abundant cytoplasm containing dust-like granules which stain pink with acid fuchsin and eosin. Zondek¹³ found the same anterior pituitary changes in a man who had died of chorionepithelioma.

Experimentally, Fels⁴ produced the same effect in test animals by injections of fluid obtained from hydatidiform vesicles. Berblinger¹⁴ and Baniecki¹⁵ produced typical pregnancy changes in the hypophyses of rabbits and guinea pigs by injections of placental extracts.

These clinical and experimental data seem to indicate that the hypophyseal pregnancy changes of normal and chorionepitheliomatous women are due to stimulation by a hormone elaborated by chorionic epithelium and that the product, prolan, obtained from the urine of pregnancy is not the pituitary sex hormone but rather a principle capable of stimulating the sex cells of the anterior pituitary lobe to increased activity. The observation of Reichert¹⁶ that prolan is ineffective in stimulating ovarian activity in hypophysectomized rats and puppies is supportive of the aforementioned hypothesis. Hill and Parkes,¹⁷ however, deny the accuracy of Reichert's findings and attribute the ineffectiveness of prolan to stimulate the ovaries of hypophysectomized animals to the high concentration of toxic substances said to be present in prolan. The fact that the maximum ovarian effect of prolan is far below that of anterior pituitary lobe extracts (Evans¹⁸) is further evidence that prolan is biologically different from the anterior pituitary sex hormone.

Lutein Cysts.—That hyperluteinization of the ovaries is the result of excessive pituitary stimulation was shown by the experimental work of Evans¹⁹ as early as 1921, and later by the work of Zondek and Aschheim²⁰ and others. The degree of luteinization primarily depends upon the amount of anterior pituitary lobe tissue or extracts thereof employed in treating test animals. Individual and species susceptibility to the hormone and the method of administration are naturally important factors. Clinically, Wagner²¹ found polycystic ovaries, typical of those seen in hydatidiform mole or chorionepithelioma, in a nonpregnant woman suffering from a pituitary adenoma. Her uterus was extirpated because of the possible presence of chorionepithelioma. Microscopic examination, however, showed an exaggerated pseudodecidual reaction and no evidence of trophoblastic tissue. She was thereafter treated by intensive irradiation of the

pituitary gland, hence, there was no possibility of determining the cellular structure of the pituitary tumor which provoked hyperluteinization.

The luteal hormone, progesterin, primarily exerts its effect on the endometrium in creating a nidatory state but does not, in the light of our present knowledge, directly influence the embryonic structures. It is, therefore, apparent that the lutein cysts found in hydatidiform mole and chorionepithelioma are the result of excessive stimulation derived from the anterior pituitary lobe and bear no causal relation to these conditions as Santi (cited by Novak and Koff¹²) and others believe. The fact that these cysts often persist for a considerable period of time after termination of a hydatidiform-mole pregnancy without giving rise to abnormal endometrial changes is clinical evidence that the formation of lutein cysts is sequential and not causative of hydatidiform mole and chorionepithelioma.

Some degree of abnormal lutein activity in the theca interna and granulosa is practically always present in hydatidiform mole and chorionepithelioma, even in the absence of enlargement of the ovaries, though in our case the extirpated ovary shows no evidence of abnormal lutein activity. Whether the other ovary, left in situ, would show lutein activity were it available for examination is problematical.

In chorionepithelioma the incidence of large lutein cysts is only 9½ per cent, whereas in hydatidiform mole they are present in 59 per cent of the cases. These cysts invariably regress spontaneously after the removal of the hydatidiform mole or chorionepithelioma, again indicating their dependence upon the uterine lesion which, as stated before, probably exerts its influence on the ovaries through the medium of the anterior pituitary lobe.

SUMMARY AND CONCLUSION

Abnormal uterine bleeding following a normal or mole pregnancy should not be treated by radium because it masks the local symptoms of chorionepithelioma.

It is impossible to make an early diagnosis of chorionepithelioma by means of uterine curettage.

The two cases of chorionepithelioma herein reported show by contrast the value of the Aschheim-Zondek reaction in the diagnosis and prognosis of the disease.

The source of the hormone, prolactin, responsible for the Aschheim-Zondek reaction, is living chorionic epithelium which should not persist longer than two weeks after termination of a normal pregnancy or eight weeks after expulsion or operative removal of mole pregnancy.

The quantity of the hormone, prolactin, excreted is proportional to the amount of abnormal chorionic epithelium present, hence a gradual increase in prolactin excretion accompanying abnormal uterine bleeding

following termination of normal or mole pregnancy is indicative of a proliferative process—chorionepithelioma.

Persistence of the Aschheim-Zondek reaction after extirpation of the uterus for chorionepithelioma points to metastasis which should be located and treated by means of intensive irradiation.

Prolan is probably a placental hormone and exerts its influence on the ovaries through the medium of the anterior pituitary lobe. The degree of ovarian response in chorionepithelioma is variable, depending upon intrinsic ovarian conditions and the responsiveness of the anterior hypophysis to prolactin stimulation.

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1829 PINE STREET.

DISCUSSION

DR. FRANKLIN L. PAYNE.—The first case reported was treated before we were as generally hormone conscious as we are at the present time.

I would like to ask, What happens to the female sex hormone in hydatidiform mole? Is it increased or does it disappear from the blood and the urine? In the diagnosis of chorionepithelioma the criteria are fairly clear. Eight weeks after a mole has been expelled, if the Aschheim-Zondek test is positive in increasing dilutions of urine, we certainly suspect chorionepithelioma. Two weeks after normal delivery, if such is the case, we suspect chorionepithelioma. What are the criteria by which we can make a diagnosis of mole?

In attempting to diagnose mole, recently I injected 3 c.c. of urine in divided doses and got a positive reaction. The next day x-ray diagnosis of twins was made.

Another point that should be noted in following up chorionepitheliomas with the Aschheim-Zondek test is that these patients usually have total hysterectomy, and may give false positives as a result of the removal of the ovaries. We must therefore dilute the urine when testing for metastases or local recurrence.

I cannot agree with Dr. Mazer's statement that chorionepithelioma should be suspected in all cases of vaginal or uterine bleeding which develop after pregnancy. In a recent review of 420 cases of functional uterine hemorrhage at the University Hospital, we found that a surprisingly large number of these patients gave such a history. The subsequent records of these patients showed that none had chorionepithelioma.

DR. JOHN C. HIRST.—I had another case that I presumed to be a twin pregnancy at ten weeks, who behaved almost identically as the above patient with profuse bleeding, over-enlarged uterus, etc., resembling hydatidiform mole. This woman gave a strongly positive Friedmann test with the use of only 2 c.c. of urine (i.e., only one-fifth the usual amount) and later proved to be a twin pregnancy.

DR. DANIEL LONGAKER.—I feel that a word of caution should be offered regarding the acceptance of the Aschheim-Zondek test and the Friedmann test as evidence of chorionepithelioma in the absence of clinical evidence.

In one case that came under our care about eighteen months ago, a positive diagnosis of chorionepithelioma was made because of a persistent Friedmann test and Aschheim-Zondek test. Dr. Mazer had the opportunity to examine and verify this finding after I was bold enough to save this woman's uterus, ovaries, contents of her pelvis, and certainly her happiness. She was only twenty-two years of age. She was not operated upon, made a perfect recovery, and it seems safe to say that she did not have chorionepithelioma; there was no clinical evidence.

DR. THADDEUS L. MONTGOMERY.—During the past week I have discharged from the hospital a patient whose clinical history, biologic tests, and pathologic findings have some bearing on the problem presented in this paper, and on one of the questions raised in the discussion. I refer particularly to the frequency of a positive estrin test in hydatidiform mole and chorionepithelioma.

The patient started some six months ago with what appeared to be a normal pregnancy. For two months, however, she suffered with rather severe nausea and vomiting. At the fourth month the uterus failed to increase in size, in fact it appeared to regress in its dimensions.

Vaginal bleeding associated with serous discharge set in three weeks ago and became so severe that I was forced to perform a dilatation and evacuation. The specimen removed consisted of the ovular sac and a small embryo. In a few areas the chorionic villi showed the typical cystic appearance of hydatidiform mole, and the histologic section presented the microscopic picture of the same condition. The embryo was only 17 millimeters in length, corresponding with a six weeks' rather than a six months' pregnancy. Surprising to say, it was not necrotic. Its nutrition and growth had apparently been simply interfered with by the moderate hyperplasia of the chorionic epithelium.

The biologic tests were interesting. Three weeks before the dilatation and evacuation was performed both tests were positive. On the eve of the operation, the Aschheim-Zondek test was positive, while the Mazer-Hoffman was negative.

DR. JACOB HOFFMANN.—The Aschheim-Zondek reaction is undoubtedly a most important adjunct in the diagnosis of chorionepithelioma. For purposes of prognosis, however, its value is less certain. Clinically and histologically it is almost impossible to differentiate between the benign and malignant forms of this condition. Both may give a similar clinical picture and either may give rise to metastases. Indeed, some authorities believe that these two forms are identical and that the outcome of the case depends upon the amount of antitrophoblastic agents present in the host. Since the Aschheim-Zondek reaction is positive for both forms, it fails to aid in the task of differentiation, and we remain, as before, dependent upon the occurrence of death for the determination of what form it is with which we have been dealing.

Under the circumstances, therefore, it would seem best, before undertaking any radical procedure, to consider all factors, clinical and otherwise. The mere fact that a positive reaction has been obtained is not sufficient to justify such procedure. Emphasis should rather be placed upon the clinical evidence, especially when we recall that as yet it has not been established that a negative reaction rules out chorionepithelioma.

DR. MAZER (concluding).—The urine of women suffering from chorionepithelioma, whether benign or malignant, shows a high and progressive concentration of prolan. Since we have no means at our disposal of determining the degree of malignancy of the growth, it is essential that these patients be treated intensively, and the progress of the condition gauged by the prolan-content of the urine. Diminishing quantities of the hormone imply improvement; its total disappearance indicates either a temporary or permanent cure.

In the case of hydatidiform mole, cited by Dr. Longaker, the first test was purely qualitative and was positive because it was performed only a month after the expulsion of the mole. Subsequent tests showed a gradual decrease in the quantity of prolan excreted, arguing against the presence of chorionepithelioma.

Dr. Hirst's patient, who bore twins, showed a positive reaction with one-fifth of the usual quantity of urine employed in the Aschheim-Zondek test when she was three months pregnant. The concentration of prolan in the urine of women at the end of three months is at least four times that of very early pregnancy. The positive reaction obtained with so small a quantity of urine, in this case, was probably not due to the larger amount of chorionic tissue present in the placenta of a twin pregnancy, but rather to the relatively advanced stage of pregnancy. The quantity of the anterior pituitary-like substance, prolan, increases as pregnancy progresses up to the fifth or sixth month; thereafter, there is a gradual decrease in the quantity of the hormone.

Definite data concerning the presence or absence of excessive quantities of estrin in the urine of women suffering from chorionepithelioma are not available. Theoretically, the lutein cysts should produce a sufficient quantity of estrin to be evident in the urine when injected into castrated rodents, but only 9½ per cent of women suffering from chorionepithelioma show the presence of lutein cysts. The urine of Case 1, herein reported, showed no excess quantity of estrin probably because of the absence of lutein cysts.

THE INCIDENCE AND SIGNIFICANCE OF FALSE POSITIVE PREGNANCY REACTIONS*

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A SURVEY of the published reports of the results obtained with the hormonal tests for pregnancy is certain to impress one with the high percentage of reliability. It should, however, be emphasized that these procedures in common with other biologic tests are subject to errors. These errors may arise from faulty technic or may be inherent in the actual limitations of the tests. Clinicians must bear in mind that these tests are primarily for the detection of the presence of demonstrable quantities of anterior pituitary sex hormone or female sex hormone in the urine as found in several physiologic and pathologic states aside from pregnancy. It might be supposed that such a possibility would affect the accuracy of the tests for the presence of living chorionic elements in the body.

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The purpose of this paper is to examine the so-called pregnancy tests and the reasons for their failure to give absolute accuracy in non-pregnant conditions. It follows that the results obtained by these tests should be utilized only as adjuncts to clinical findings in the same manner as any other laboratory procedure, as, for example, the Wassermann test.

We have had the opportunity to study a series of problem cases, using both a modification of the Friedman rabbit test and the original estrin test. Table I, which summarizes our results to date, includes a previously reported series (1) of one hundred and eighty-two rabbit tests and five hundred estrin tests.

TABLE I

	RABBIT TEST		ESTRIN TEST	
	TOTAL CASES	%	TOTAL CASES	%
Pregnant				
Correct Positives	167	93.7	252	77.5
False Negatives	11	6.3	73	22.5
Total	178		325	
Nonpregnant				
Correct Negatives	168	94.4	355	96.8
False Positives	10	5.6	12	3.2
Total	178		367	
	356		692	

It will be noted that false positive readings reaching to 5.6 per cent have been obtained in this study. This would seem to indicate a relatively high degree of inaccuracy but it should be kept in mind that a misinterpretation of some of the statistics in the literature has been responsible for the prevailing notion of the low incidence of false positives. The average error reported has been under 5 per cent. This figure has been computed on the basis of errors per total cases studied rather than on the percentage of nonpregnant cases presenting diagnostic difficulties. Thus, 10 false positive results in a total of 356 cases affords 2.8 per cent error, while the same number based on the nonpregnant cases alone yields a 5.6 per cent discrepancy.

In order to evaluate the reliability of the tests it is important to ascertain the conditions which are likely to give false reactions in the non-pregnant woman. Among these have been reported the climacteric, primary ovarian hypofunction, ovarian cysts, hyperthyroidism, chorion-epithelioma, retained placental tissue, and malignancy.

Climacteric.—The climacteric is one of the conditions which may give rise to false positive reactions. The gradual decrease in ovarian activity associated with this state is accompanied by a compensatory hypertrophy of the anterior pituitary lobe and a readjustment of the

endocrine balance of the body. It should be remembered that normal quantities of anterior pituitary hormone as present in the blood of regularly menstruating women are not demonstrable by the use of injections of whole blood serum. Fluhman² and Mazer³ have investigated the hormone content of the blood of women in the climacteric. They demonstrated the presence of an excess of anterior pituitary secretion in about 60 per cent of climacteric women.

These findings are in accord with the gross and histologic changes found in the anterior pituitary gland of women following castration, namely, an increase in the basophilic cells and the presence of castration cells.^{4, 5} Engle⁶ showed a definitely greater amount of hormone in the pituitary of the gonadectomized animal than in the normal when both were subjected to the same test conditions. The histologic findings in the gland plus the evidence of hypersecretion suggest a compensatory hypertrophy of the sex-stimulating cells of the anterior pituitary lobe, the purpose of which is to stimulate the activity of the failing ovary. However, the excretion of anterior pituitary hormone in the urine at the climacteric may be due to the inability of the ovaries to utilize it. A more likely possibility is that there is a withdrawal of the inhibitory influence which the normally functioning ovary exerts on the anterior pituitary. Zondek⁷ points out that since pituitary transplants are capable of stimulating the senile ovary of a mouse or rat, the second possibility is the more likely. According to Kraul⁸ it has been shown that the administration of estrin after castration prevented the usual changes in the anterior pituitary gland.

Climacteric women occasionally show demonstrable quantities of the female sex hormone in their urine. This results because of three factors: first, the inability of the endometrium to store and utilize the small quantities of estrin present in the blood of menopausal women; secondly, because of a decreased renal threshold to the elimination of the hormone,⁹ and lastly, because of the persistence of cystic follicles which continue to function.

The excretion of both hormones of pregnancy in the urine, as explained above would account for the production of false positive results in the climacteric woman. Thus Zondek reported the presence of Prolan B in the urine of patients who had had a bilateral oophorectomy.¹⁰ Hannan¹¹ obtained false positive reactions in 4 of 12 climacteric women. Allen and Dickens¹² report the repetition of false positive reactions with two separate specimens of urine from a woman at the menopause. The following case is illustrative of our experience.

Mrs. A. B., aged thirty-nine years, when first seen was amenorrheic for four months. Her periods previously had been regular. Examination failed to reveal any enlargement of the uterus. Urine was subjected to the test for pregnancy. The estrin test was negative but the Aschheim-Zondek reaction was positive. Several months later she was complaining of typical menopausal symptoms. Her periods were recurring at six- to eight-week intervals.

Primary Ovarian Hypofunction.—A similar state of compensatory hypertrophy and hypersecretion of the anterior lobe exists in cases of primary ovarian hypofunction. The existence of this condition of the ovaries independent of anterior pituitary deficiency during the active sexual life of women has been reported by several authorities. In women with evidence of endocrinopathy usually associated with menstrual irregularities, especially amenorrhea, primary ovarian deficiency is demonstrable in from 15 to 20 per cent of cases.^{13, 14, 15} The finding of a positive Fluhman test eliminates the anterior pituitary gland as the causative factor.

The simultaneous presence of anterior pituitary sex hormone and the absence of demonstrable quantities of estrin in the blood of these women establishes the diagnosis of primary ovarian hypofunction. The presence of a positive Fluhman test accounts for the excess secretion of the hormone in the urine and the production of false positive pregnancy tests. The amenorrhea frequently resulting from this primary condition is mistaken for a symptom of early pregnancy and the presence of a false positive reaction further serves to confuse the diagnosis. Studies for the level of estrin in the blood (Frank and Goldberger test) and the characteristic clinical findings help to avoid confusion in these instances. The following case history is illustrative.

Mrs. R. P., twenty-three years of age, was seen June 25, 1932. She had one child sixteen months old. Her general appearance and demeanor were typical of women who have primary ovarian hypofunction. Her menses had always been normal. Her last period was on April 23, 1932. She had slight vaginal bleeding a few days before her visit to the office. Examination showed the uterus to be retroverted and apparently not enlarged. There was no discoloration of the cervix. Urine was taken for a pregnancy test. The estrin test was negative. The rabbit test, however, was positive. Because of these findings and the history, the possibility of a dead ovum was considered. During the second week in July the patient stained slightly but had no real menstrual flow. Reexamination on July 26 and subsequent events eliminated the existence of pregnancy.

Hyperthyroidism.—Hyperthyroidism is a further cause for the occurrence of false positive reactions with the anterior pituitary pregnancy tests. Amenorrhea or irregular menses were found in 57 per cent of cases of exophthalmic goiter by Gardiner-Hill and Smith.¹⁶ Bram¹⁷ corroborated this figure.

The suppression of menstrual activity here is probably the result of a severe systemic depression affecting all tissues of the body. In such cases hypertrophy of the anterior pituitary gland has been noted.¹⁸ Hyperfunction of the thyroid experimentally in the animal stimulates the sex cells of the anterior lobe with a resultant production of an excess of anterior pituitary sex hormone and a persistence of the corpus luteum, causing a suppression of menstruation and an excess production of

estrin.¹⁹ This was not demonstrated in human beings, however. The following case emphasizes the unreliability of the test in the presence of hyperthyroidism.

Mrs. A. S., aged forty-three years, had always had a regular menstrual cycle until August 23, 1931. The following period was missed. Study of the patient by her family physician revealed a marked hyperthyroidism with visible enlargement of the thyroid but no exophthalmus. Both the rabbit and estrin tests taken after six weeks of amenorrhea were positive. The patient was then referred to us for a therapeutic abortion. Examination failed to establish the presence of a pregnancy at this time and she was advised to wait several weeks. Subsequent examination eliminated the presence of pregnancy; the patient menstruated several months later.

It is possible because of the woman's age that the climacteric was the responsible factor for the false positive reaction.

Ovarian Cysts.—In addition, ovarian cysts associated with amenorrhea have on several occasions yielded false positive pregnancy tests by both methods. The continued production of estrin by the epithelium lining the cyst wall and the continued efforts of the anterior lobe to complete the ovarian cycle result in excess amounts of both hormones in the urine of these women as illustrated in the following case.

Mrs. R. F., aged twenty-six years, married three years, had aborted one year ago. Patient missed her period in December, 1931. Since then she has bled monthly but the flow has been decreased. Her last period was on February 12, 1932. Both hormone tests taken a few days before this period were positive. She was seen again on May 20, 1932. At this time, on examination the uterus was thought to be enlarged to the size of a three and a half months' pregnancy. The patient stated that she had had no intercourse for a period of five months. Repetition of the estrin test yielded a positive reading on May 23. The same test repeated on May 25 gave a negative result. In view of the previous positive tests, the disproportionate enlargement of the uterus, and the abstinence from coitus, a diagnosis of fetal death was made. On June 11, the patient reported that she had just finished a menstrual period. Reexamination revealed the true pathologic condition. The uterus was found to be small and a large ovarian cyst was palpable behind and to the right of the fundus.

Fetal Death, Inevitable Abortion, Ectopic Pregnancy.—Fetal death, inevitable abortion, and ectopic pregnancy likewise merit consideration in this discussion. The anterior pituitary sex hormone test is really for a functional placenta or chorionic derivatives. Moreover, the presence of the hormones of pregnancy can be demonstrated in the urine for a week after the total expulsion of the fetus and placenta. Therefore a positive reaction does not establish the presence of a fetus. Likewise, during the first week after delivery a positive test is no indication of retention of placental elements.

The continued elaboration of the sex hormones depends upon a vascular connection between the trophoblast or its successor, the chorionic

villi, and the maternal organs. Death of the ovum, either intrauterine or ectopic, does not necessarily result in separation of vascular contact between maternal organs and the product of conception. This permits continued production of anterior pituitary sex hormone in these cases.

Bland and his coworkers²⁰ claim that the simultaneous use of the Aschheim-Zondek and the estrin tests has proved of value in the diagnosis of fetal death. They found that patients who gave a positive Aschheim-Zondek reaction and a negative estrin test on repeated occasions eventually miscarried. Our experience with the tests in cases of fetal death and inevitable abortion has been variable and inconclusive.

In one instance we were temporarily misled because of our misinterpretation of what we believed to be a false positive reaction.

Mrs. E. M., aged twenty-three years, had an infected abortion two years ago. Her menstrual cycle had always been normal. She was a short, thin, extremely feminine blonde, a characteristic picture of the hypoovarian type. She missed her December, 1932, period but had slight staining at this time, associated with some abdominal pain. Examination revealed a mucopurulent cervical discharge and a fundus smaller than normal. The urine gave a positive rabbit test and two negative estrin tests. With subsidence of symptoms, the characteristic appearance of the patient, the small fundus, and two negative estrin tests, it was thought that the rabbit test was a false positive reaction due to primary ovarian hypofunction. Subsequent observation and operation proved the presence of an ectopic pregnancy.

Malignancy.—The findings of others in cases of malignancy are pertinent to a study of the causes of false positive reactions. Zondek²¹ claimed originally to have obtained characteristic pregnancy response by the injection of urine in 15 per cent of 118 cases of malignant disease. More recently he reports²² that the urine of carcinomatous patients will produce only APR-i, and very rarely ii and iii. Hannan¹¹ demonstrated the presence of anterior pituitary hormone in the urine in sufficient quantity to give a positive Aschheim-Zondek reaction in mice in 2 of 7 cases of genital carcinoma. Sussman²³ in a study of the relationship of pituitary activity to malignancy reported positive Aschheim-Zondek tests in 14 of 18 cases of malignancy and confirmed by histologic study the fact that the anterior lobe did show a degree of activity appreciably higher than in the normal. We obtained no false positives in this class of patients.

Organotherapy.—It should be borne in mind that occasionally urine specimens are obtained from patients who are under treatment for sterility or menstrual disorders. In such cases one should be certain that the patient is not receiving roentgen ray stimulation to the ovaries and anterior pituitary gland, or hormonal therapy in any form before accepting a positive urine reaction as indicative of pregnancy.

The case of Mrs. M. B., is in point. She was twenty years of age. Her menses had started at the age of thirteen and were regular until her child was born. Since then she has menstruated at intervals varying from three to eight months. She had been amenorrheic for four months previous to her visit on April 9, 1932. Pelvic examination revealed an infantile uterus and no other pathologic condition. She was treated with massive doses of female sex hormone, moderate quantities of thyroid, and regulation of diet. One month later she was still amenorrheic, but the uterus had increased to such size that pregnancy was suspected. The estrin test, however, was negative. The following month examination showed a slight decrease in the size of the uterus and the patient was still amenorrheic. X-ray stimulation of the anterior pituitary gland and ovaries was given during June, 1932. The estrin test performed July 15 was positive for pregnancy. Subsequent observation of the patient proved that she was not pregnant.

Technical Errors.—Lastly there is always a possibility of error due to faulty technic. The rabbit test is practically free from such difficulties if properly isolated rabbits of suitable age and weight are used. Friedman²⁴ has stressed the value of using the postpartum rabbit. Positive reactions are grossly visible and characteristic in appearance. When doubtful reactions are obtained, the test should be repeated before committing oneself to a definite diagnosis.

The accuracy of the estrin test depends to a considerable degree upon the ability and experience of the technician. Complete castration, elimination of mild and delayed reactions, and the avoidance of non-nucleated squamous epithelial cells in the preparation of smears will tend to decrease the possibility of obtaining false positive reactions by this test.

Because of the extremely small amount of urine necessary to produce a positive reaction, care must be taken that the syringe and needles used for consecutive tests are thoroughly cleansed before each individual injection.

SUMMARY

The so-called pregnancy tests are for the detection of excess quantities of sex hormones in the urine, which may occur in conditions other than pregnancy.

Among the conditions giving rise to false positives are the climacteric, primary ovarian hypofunction, ovarian cysts, hyperthyroidism, chorion-epithelioma, retained placental tissue, and malignancy.

In this series we have obtained 5.6 per cent false positives with the rabbit test and 3.2 per cent false positives with the estrin test.

The simultaneous use of the anterior pituitary and estrin tests will yield a higher percentage of correct diagnoses of pregnancy because of the low incidence of false positives with the latter.

I wish to express my indebtedness to Dr. Charles Mazer for his permission to use his private office records, his laboratory facilities, and above all for his kindly interest and helpful suggestions in the preparation of this paper.

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DISCUSSION

DR. ARTHUR FIRST.—When one bears in mind the synergistic interrelationship of the anterior pituitary gland and the gonads and the thyroid and the gonads, one can readily understand the reasons for these false positive pregnancy reactions. Nature endeavors in every instance to maintain an equilibrium of its internal glandular secretions. Any deviation from the normal, whether in the form of a hypo- or hyperactivity of the gland, will cause corresponding reactions in another gland. When the function of a gland depends upon stimulation by a donor gland and the original gland is removed, it will be followed by a compensatory hyperactivity of the donor gland. Therefore, in the menopause which is characterized by a decline of ovarian activity there may follow a compensatory hyperactivity of the anterior pituitary gland with a resultant incorrect positive hormone test. Similarly primary ovarian hypofunction may yield an analogous false positive reaction.

Retention cysts of the ovary are usually due to a thickened tunica albuginea due to insufficient anterior pituitary stimulation. The increased estrin production of these cysts may thus yield a false positive Mazer-Hoffman reaction. Hyperthyroidism accelerates cellular activity throughout the body, may cause an overactive anterior pituitary gland with hyperluteinization of the graafian follicle and an excess of anterior pituitary and estrin hormone in the urine.

It may be of interest to compare our results in the Obstetrical Department of Jefferson Medical College Hospital, under Dr. P. Brooke Bland, with those of Dr. Ziserman and Dr. Mazer. In a series of 1000 hormone tests for pregnancy on problem cases, employing the Aschheim-Zondek and Mazer-Hoffman tests concurrently, we obtained 8 per cent false positive reactions with the former test and 1 per cent with the latter test.

We have a much lower percentage of correct positives than Dr. Ziserman, however, because any case which is suspicious we label as a negative reaction. Most of our false positives are from specimens sent in by the general practitioners, although more than two-thirds of the specimens were sent in by the specialist in obstetrics and gynecology.

I think we should not become too pessimistic or skeptical about these false positive reactions. Not every patient in the menopause or with hyperthyroidism will yield a positive hormone test. To illustrate this point we performed biologic tests on a series of patients who were definitely known *not* to be pregnant with the following results:

50 patients in the menopause-----	1 positive reaction.
10 patients with primary ovarian hypofunction-----	no positive reaction.
5 patients with ovarian cysts-----	no positive reaction.
5 patients with hyperthyroidism-----	no positive reaction.
5 patients with advanced malignancy-----	no positive reaction.

One patient with hyperthyroidism and primary ovarian hypofunction came to us for treatment of her sterility of nine years. She was given a tablet of progynon, 200 rats units daily, for 1 month. One month later she missed her period. A hormone test was reported positive. Did this necessarily mean that the positive reaction was false because the patient had hyperthyroidism and organotherapy? No. Subsequent developments revealed that the patient was truly pregnant.

The conclusion we should draw from this is that although we may occasionally obtain a false positive reaction, the hormone tests for pregnancy still remain a most valuable adjuvant in the diagnostic armamentarium of every qualified obstetrician and gynecologist.

DR. GEORGE M. LAWS.—It is important for us to understand the physiology involved in order that we may learn to evaluate the tests. While the percentage of false positives is small, it happens that they occur in the problem cases and, therefore, are relatively more important than the figures indicate.

THE RESULTS OF INTRAUTERINE CULTURES OBTAINED WITH THE SHEATH TUBE*

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(From the Department of Gynecology and Obstetrics, Graduate Hospital, Graduate School of Medicine, University of Pennsylvania)

THIS communication deals with the study of intrauterine bacteriologic findings in seventy-four normal and six abnormal postpartum cases. It is based upon a similar investigation conducted by Drs. Nicholson and Evans in 1908. In fact this present effort was originally undertaken as a check-up on the earlier study. Because of improved laboratory technic and better knowledge in the field of bacteriology in the past twenty years, it was felt that a check-up conducted at the present time might show results different from those obtained in earlier days. This study was conducted on the Dr. Wm. R. Nicholson service at the Graduate Hospital, Philadelphia.

For the purpose of this study we have defined a normal case as one which runs an afebrile postpartum course with no instrumental or manual interference during labor, other than cases delivered by low outlet forceps.

The method of obtaining the intrauterine cultures was as follows: With the patient in the lithotomy position and the external genitalia carefully cleansed, a Sims' speculum exposed the cervix which was also cleansed with bichloride. The Nicholson culture collector with cap closed was inserted into the uterine cavity. The cap was

*Read before the Philadelphia Obstetrical Society, December 1, 1932.

opened by pushing the tube into the cavity of the uterus and as much lochia as possible was sucked into the glass tube with a syringe. The glass tube was then withdrawn until its end was engaged within the metal tube and both were simultaneously withdrawn from the patient. The ends of the glass tube were sealed with wax and the tube was sent to the laboratory where it was washed in bichloride before the ends were broken and cultures made.

The first twenty cases were cultured in this manner. On several occasions we received reports from the laboratory of contaminations, which we were unable to explain. Our thought is that in these cases we failed to pull the glass tube into the lumen of the sheath before withdrawing the entire instrument from the uterine cavity, thus exposing the end of the glass tube to the bacterial flora of the endocervix and vagina.

To overcome this, we have somewhat modified the metal sheath, so that the all-important flanged metal cap is opened and closed by operating a thumb screw placed on the handle of the instrument. Thus the top of the metal sheath is closed when the instrument is withdrawn as well as when it is introduced into the uterus.*

It also became apparent that the transportation of glass tubes from ward to laboratory and back would result in considerable loss and breakage if a large series of cultures were to be studied; in the interest of economy and efficiency therefore, we further modified our earlier procedure by transferring as much lochia as we collected directly from the glass tube into the test tube containing the sterile brain broth after properly flaming the top of the test tube as well as the end of the culture tube. These sterile containers of brain broth and lochia were then sent to the laboratory for study. Dr. Boerner, in charge of laboratories at the Graduate Hospital, personally did the actual laboratory work and only his help and full-hearted cooperation made the investigation possible.

Cultures were taken in three periods of the puerperium: First, during the first three days, second, from the fourth to the sixth day, and third, from the seventh to the tenth day postpartum; thus three cultures were taken from each patient except in several instances and a total of 231 cultures were studied.

TABLE I. CULTURES FROM CASES IN WHICH MEMBRANE RUPTURED FOUR HOURS OR LONGER BEFORE DELIVERY

LENGTH OF TIME MEMBRANE RUPTURED BEFORE DELIVERY	TOTAL	CONDITION OF CULTURES				
		BACTERIA PRESENT IN ONE OR MORE CULTURES				ALL CULTURES STERILE
		TOTAL	IN ONE ONLY	IN TWO ONLY	IN THREE	
Total	23	6	5	1		17
Four and less than five hours	8	4	4			4
Five and less than six hours	3					3
Six and less than seven hours	5	1	1			4
Eight and less than nine hours	1	1		1		
Twelve and less than thirteen hours	1					1
One and less than four days (One to two days)	2					2
Four and less than seven days (Four to six days)	3					3

*Instrument made by Pilling of Philadelphia.

TABLE II. CULTURES FROM ALL CASES OF NORMAL DELIVERY ACCORDING TO LENGTH OF TIME MEMBRANE RUPTURED BEFORE DELIVERY

TYPE OF CASE	TOTAL	CONDITION OF CULTURE				
		BACTERIA PRESENT				STERILE
		TOTAL	IN ONE ONLY	IN TWO ONLY	IN THREE	
Total	74	20	15	4	1	54
Membrane ruptured in less than four hours	51	14	10	3	1	37
Membrane ruptured in four hours or longer	23	6	5	1		17

The presence of a thin grayish membrane over the cervix in all puerperal cases, described by Dr. Goodall, is not confirmed by our study. We had occasion to observe the cervix every time a culture was taken and yet not in a single instance was this membrane seen.

Of the twenty positive cultures studied in a total of 74 normal deliveries, one case showed positive cultures in all three periods. This patient (Case 12) had sapremia or lochial block and the organism found was the *Staphylococcus albus*.

We had four cases in this group with positive cultures in two periods. Two of those cases (Cases 46 and 61) had almost total suppression of lochia with moderate elevation of temperature. The offending organism in both these cases was the *Staphylococcus albus*. The other two cases belonging to this group were positive because of error in technic. In one patient (Case 10) the first culture showed *Bacillus alkaligenes* and the break in technic occurred when the lochia was transferred from the glass tube to the test tube containing the brain broth. The second culture of this same patient was vitiated because the patient was extremely uncooperative at the time. The organism in this instance was the *Staphylococcus albus*.

The organisms found in the fourth patient (Case 19) were *Staphylococcus aureus* on the first culture and *Staphylococcus albus* and *Bacillus proteus* on third culture. Both were contaminations and are so noted in our notes at the time the cultures were taken.

The other positives noted in this normal group showed a wide variety of nonpathogenic organisms and were the result of errors in technic either noted at the time of culture or in the laboratory.

We report all these cases without deletion or corrections, exactly as the reports came from the laboratory, not only for scientific accuracy but because we wish to lay particular emphasis on the fact that absolutely scrupulous care must be exercised in this work. In other words all our cultures in this group of seventy-four cases, taken during three periods of the puerperium with the exception of the scattered contaminations just described, showed sterile intrauterine cultures.

The remaining six cases studied were problems for diagnosis. In detail they are:

CASE 1.—Thirty-six years of age, para xi, white. Delivered spontaneously. One vaginal during labor, under strict asepsis, membranes ruptured thirty-five minutes before delivery. No lacerations. Two days later her temperature was 104°, pulse 116, respiration 36. Intrauterine culture showed *Streptococcus hemolyticus*. Seven days later a blood culture showed the presence of the same organism in the blood.

CASE 34.—Twenty-two years, para i, white. Delivered by manual dilatation of cervix with decomposition of breech. After delivery she had chills and fever, the temperature going as high as 106°. Intrauterine culture was negative. The patient died of septic thrombophlebitis and pneumonia. This was proved by a postmortem examination.

CASE 35.—Twenty-seven years, para ii, colored. Admitted to Graduate Hospital with history of miscarriage five weeks ago. Febrile since that time. Intrauterine culture four days after dilatation and evacuation, showed *Bacillus coli*; the intra-uterine debris showed a tuberculous condition.

CASE 37.—Thirty-six years, para viii, white. Postabortal chills and fever. This patient was packed before her admission to the Graduate Hospital. Intrauterine culture showed *Streptococcus hemolyticus*.

CASE 51.—Nineteen years, para i, colored. Packed for postpartum hemorrhage moderate elevation of temperature. Intrauterine culture showed *Streptococcus hemolyticus*. The blood cultures in Cases 37 and 51 were negative on repeated examinations, but both patients had a stormy convalescence and were diagnosed clinically as cases of septicemia. Both these cases recovered.

CASE 67.—Nineteen years, para i, colored. Three vaginal examinations during labor, high forceps, third degree laceration. Febrile postpartum cultures were all sterile. The case proved to be one of pyelitis.

Of the eighty cases studied, seventy-three were examined vaginally, one to six times during labor, under strict aseptic precaution, of course. It is rather significant that these examinations had no effect on the intrauterine bacterial content. We explain this on the grounds that our service insists on thorough and most careful scrubbing of external genitalia immediately before each vaginal examination of a patient in labor.

SUMMARY AND CONCLUSIONS

1. The germ content of the uterus has been controversial ground for years and we fear it is going to continue so until a faultless technic is devised in the taking and study of these cultures.
2. Extreme care must be exercised in taking of cultures with the technic that we adopt and note immediately all error in technic at the bedside or in the laboratory, so that the results may be correctly interpreted.
3. The uterine lochia is sterile in normal postpartum cases. Contrary to common belief, the length of time of the rupture of membranes before delivery does not affect this result.
4. Intrauterine cultures during the puerperium materially assist in a diagnosis of sepsis.

5. The presence of the streptococcus group in the uterus has always given constitutional evidence of infection and therefore it is our belief that this organism in the uterine cavity always gives symptoms and it is not a saprophite.

6. We have seen no grayish membrane lining the cervix in any of our cases. We therefore, cannot confirm the statement that this membrane is of common occurrence.

7. Our study fully confirms the conclusions reached by Drs. Nicholson and Evans in their investigation of the same subject.

263 SOUTH TWENTY-SECOND STREET.

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DISCUSSION

DR. FREDERICK BOERNER.—First I want to make it clear that the main object in these studies was, primarily, to detect streptococci if present, and secondarily to detect any other aerobic organisms that might be present. For the original cultures we used Rosenow's brain broth. If growth appeared subcultures were made on blood agar plates and the organisms present were further studied for identification. We did not attempt to culture for anaerobic organisms so those cases reported as sterile were only sterile so far as aerobic organisms were concerned.

DR. T. L. MONTGOMERY.—To what extent bacteria invade the uterine cavity and grow after the delivery is a much disputed question. Dr. Jaffe's careful work in collecting specimens of intrauterine fluid from normal patients at successive periods after delivery throws valuable light upon the question. His results agree rather closely with those obtained a few years ago by Dr. Nicholson, using a somewhat similar apparatus. Their cultures indicate that after spontaneous delivery and during a normal puerperium, bacteria do not frequently invade the uterus.

These findings are quite at variance to those reported by certain other investigators, particularly the group at Johns Hopkins. In fact, the general consensus of opinion is that bacteria can be detected in the cavity of the uterus within forty-eight hours after delivery. The very evident difference of opinion on the matter simply indicates that the problem is by no means a settled one, and that as rapidly as new methods of collecting specimens are devised, and new bacteriologic culture media and methods are employed, different findings will be reported.

We have made the practice in the Obstetric Department of the Jefferson Medical College Hospital of culturing the lochia in all instances where a temperature of 100.4° F. or higher was sustained for more than two days after delivery, when the cause of the morbid reaction was not evident to the ordinary methods of examination. Our findings, naturally, have no bearing on the problem of the normal case. In Dr. Jaffe's report, however, I notice there is no reference to the finding of anaerobic bacteria and I wonder if special methods were used for the culturing of this type of organism which Dr. Williams considered so frequent a cause of puerperal morbidity.

Dr. Jaffe also states that he finds no relationship between premature rupture of the membranes and the presence of bacteria in the puerperal uterus. We have

studied this question from the standpoint of the histologic examination of the placenta. In a series of 500 placentas we found inflammatory reaction in the membranes, margin of the placenta or cord vessels in over 10 per cent. In many of these we were able to demonstrate the presence of bacteria by special tissue staining methods. Upon examining the histories in this group we found that most of the cases occurred in instances where the labor was long and tedious and terminated by vaginal operative delivery, or when the membranes had been ruptured for long periods of time.

DR. J. K. JAFFE.—In reporting sterile intrauterine cultures in the cases where the membranes ruptured four hours or longer before delivery, it must be remembered that this entire series consisted of only 23 cases. We cannot draw definite conclusions from so small a series. In view of our findings, however, the subject deserves further investigation.

THE INFLUENCE OF FEMALE SEX HORMONE UPON BLOOD COAGULATION OF THE NEWBORN*

JOHN C. HIRST, A.B., M.D., F.A.C.S., PHILADELPHIA, PA.

FROM the original report of Birch,¹ and recent articles of Kimm and Van Allen,² Kugelmass,³ and others, it appears that true hemophilia in male children may be prevented or benefited by administration of ovarian substance. These results are based upon the fact that male individuals normally produce in very small amount a hormone identical with the female sex hormone, but fail to do so in hemophilia.

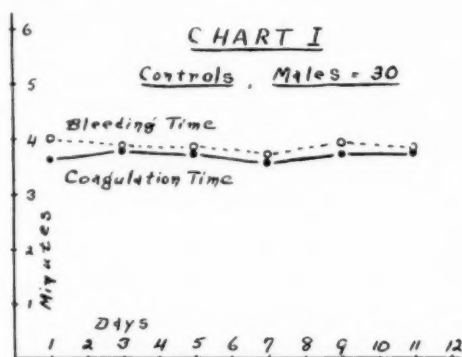
Most of the reported results in the treatment of bleeders with estrin or female sex hormone have been obtained by the use of unfamiliar or unstandardized ovarian products, and none have included the action of estrin in hemorrhagic disease of the newborn, in whom the concentration and effects of estrin present especially interesting and important features.

Each fetus is permeated with maternal estrin at birth, so that much of the hormone can be recovered from the umbilical blood, and in the first few days of life from the urine. Activity of this large quantity of estrin before it is eliminated by excretion through the kidneys and bowel is expressed in accumulation and secretion of colostrum in the breasts of both sexes, and by greater development of the uterus (sometimes associated with uterine bleeding) in the newborn female than in the infant of twelve months.

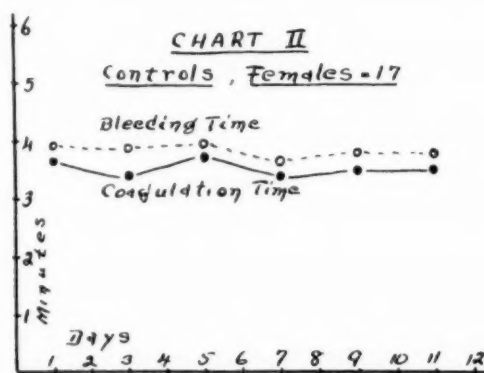
The present report is offered for the purpose of showing the effect of certain standardized preparations of estrin upon normal newborn infants, and upon several abnormal infants, including one case of moderate hemophilia. The study of each group consisted mainly in

*Read at a meeting of the Obstetrical Society of Philadelphia, December 1, 1932.

noting the duration of bleeding without pressure from heel punctures, and the time required for coagulation of blood drawn into uniform machine-made capillary tubes. While the tube method is admitted to be relatively crude, Dr. Stuart C. Runkle, Jr., who performed all of the tests, was able to complete his observations with a minimum of variation. In addition to the above, each infant was examined particularly for engorgement of the breasts, icterus and vaginal or other bleeding.



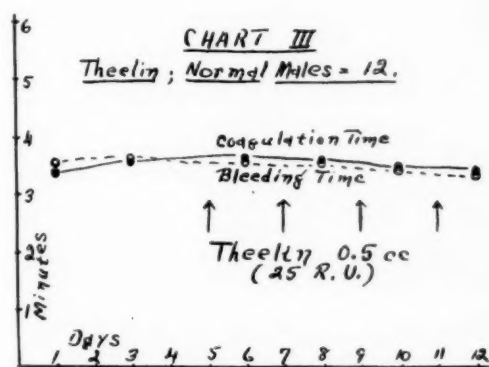
Group I.—This group included 47 consecutive control infants, 30 male and 17 female through the courtesy and from the service of Dr. William R. Nicholson under conditions identical with the test babies. The average weight of the infants was 7 pounds 10 ounces, only two below 6 pounds; all were breast fed and all were discharged from the hospital in good condition without intercurrent complications of any sort.



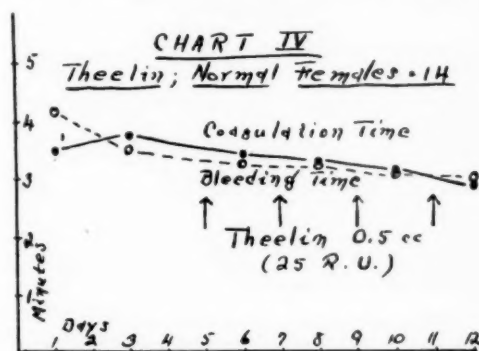
Results: Both males and females showed very straight bleeding and coagulation curves as shown in Charts I and II. Thirty-six per cent of the infants had enlargement of the breasts; 8 males and 5 females showing moderate breast engorgement, while 2 males and 1 female showed severe engorgement, 2 cases noted on the first day,

5 on the second, and 7 on the third day. Only 2 babies (both males) presented frank icterus among the 47 control infants, and none showed vaginal or other bleeding.

Group II.—Twenty-six newborns, 12 males and 14 females, were injected with estrin in the form of 0.5 c.c. (labeled 25 R.U. and containing probably 10 to 15 R.U.) of theelin every other day from the fifth day after birth. The average weight of these infants was 7 pounds 11 ounces, only one below 6 pounds, all but one were breast fed, and all but two were discharged in excellent shape without complications of any sort.



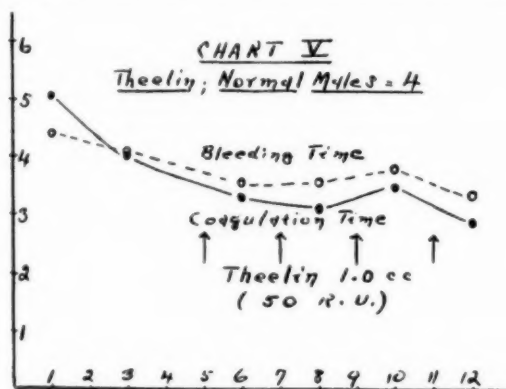
Results: The males showed normal straight bleeding and coagulation curves as shown in Charts III and IV, but the females showed a gradual but definite reduction of each curve from four to three minutes. Thirty-four per cent of this group showed enlargement of the breasts as follows: no males, but 6 females had moderate breast en-



gorgement, while in 1 male and 2 females there was excessive engorgement, in most instances following the initial theelin injection and increasing with subsequent injections. Two babies (a male and a female) showed icterus, the former but slightly, which parallels the incidence of icterus in the control group, in which the discoloration was manifest mostly by the third day. The female with decided

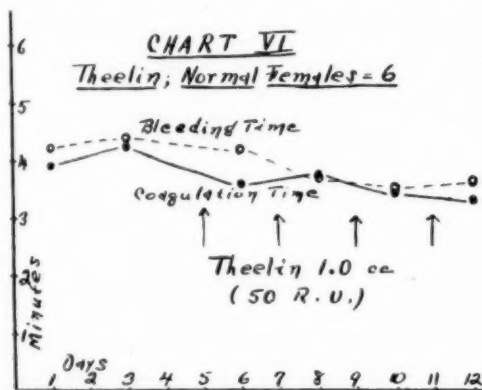
icterus from the second to the seventh day cleared completely after two injections of theelin. One infant showed definite vaginal bleeding after two injections of 0.5 c.c. of theelin, which continued for one day only and did not reappear after three more injections.

Special Cases.—One female bottle-fed infant received 9 injections of 0.5 c.c. of theelin in eighteen days without further reduction of the bleeding and coagulation curves after a moderate early drop. An-



other baby suffering with congenital stricture of the bowel received an infusion of calcium gluconate and glucose along with theelin without change in its low blood curves.

Group III.—Ten infants, 4 males and 6 females, were injected every other day from the fifth day of birth with 1.0 c.c. of theelin labeled 50 R.U. and probably containing about 25 R.U. Their weights aver-

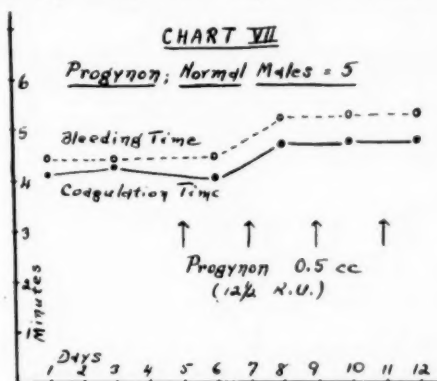


aged 6 pounds 12½ ounces, only one was below 6 pounds, all were breast fed and all discharged without complications in good condition.

Results: Both males and females showed gradual declines in coagulation and bleeding curves (Charts V and VI). Eighty per cent of these infants had enlargement of the breasts; 1 male and 6 females presented moderate breast engorgement, and one female severe en-

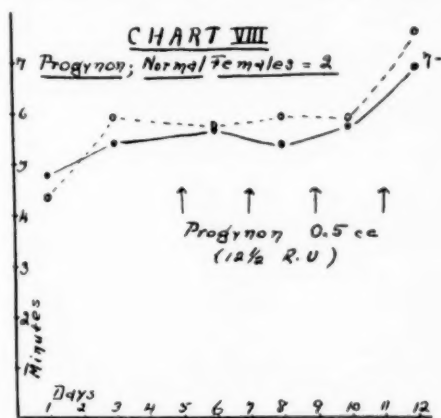
gorgement, in each case increasing with further injections. Two females were icteric, one after the first injection on the fifth day, and one by the third day, before injection, each entirely cleared by the third injection, in less than the usual time.

Group IV.—Seven newborns, 5 males and 2 females, were treated with injections of 0.5 c.c. of progynon labeled $12\frac{1}{2}$ R.U. (probably containing 6 or 8 R.U.) every other day from the fifth day after birth.



These babies averaged 7 pounds 5 ounces, were all breast fed and discharged from the hospital in excellent condition without complications.

Results: Coagulation and bleeding curves (Charts VII and VIII) showed decided elevation in both males and females, the latter increased nearly three minutes. One female showed moderate breast



engorgement, and two males marked engorgement, especially following the first progynon injection. Icterus and vaginal (or other) bleeding did not appear in this small group.

Group V.—Special Cases: 1. Hemophilia of very mild degree in a male infant born to a woman in whose family there have been many persistent bleeders, including a recent nephew who required several

We suggest, instead of giving a 5 per cent glucose solution to the newborn until the breast milk arrives, to use a diluted solution of evaporated milk, but not to use condensed milk. Baginsky, long ago, recommended the administration of gelatin to the newborn to reduce clotting time. It may be administered in a 3 per cent solution as a diluent for the evaporated milk.

A hemophiliac boy at present in my ward was admitted with a massive hemorrhage in his leg and bleeding from the gums. With the second injection of theelin the bleeding was arrested. The coagulation time was reduced from an hour and twenty minutes to twenty-one minutes in seven days. Female sex hormone seems to be a specific in the treatment of hemophilia. Today the hemophiliac has been placed in the same class as the diabetics or the cretins who may continue to enjoy life, as long as they are able to procure the specific hormone.

THE IMPORTANCE OF THE PULSE RATE IN LABOR*

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(From the Department of Obstetrics and Gynecology, University of Kansas)

THE basis for this study was a review of a series of case records of private patients prior to 1926. In this analysis three facts were most convincing:

First—That patients who delivered normally would usually have a pulse rate consistently below 100 and would exhibit a normal condition throughout their stay in the hospital and subsequent postnatal period.

Second—That in those patients where operative delivery proved necessary, the same uneventful convalescence could be secured if the pulse rate could be kept below 100.

Third—Elevation of the pulse rate above 100 was found to result from insult whether medical, surgical, or obstetrical in type.

This caused us to conclude:

First—That the successful termination of labor depended upon management.

Second—That from the time the patient entered the hospital, was delivered, and returned to her room, the pulse rate should be 100 or less. We have not been able to attain this goal at all times. However, the closer we have adhered to this ideal the more we have been convinced of its importance.

In 1926 I began a second series of cases in an attempt to evaluate the importance of the pulse rate in labor. Fourteen hundred and sixty-four consecutive private cases are now available for study. Of this number 1400 were occiput presentations. The remaining 64 received the same care but time and space prevent a separate analysis. Patients cared for in consultation, or neglected cases referred to us in the hospital, and a few records with insufficient data are not included in this series.

*Read at the Fourth Annual Meeting of the Central Association of Obstetricians and Gynecologists, Memphis, Tenn., September 15-17, 1932.

With few exceptions, patients were cared for during the prenatal, natal, and postnatal periods. Ninety per cent were examined at the second, fourth, and sixth postnatal months, and the remaining 10 per cent were examined at least once postnatally. Each patient was studied for length of labor, type of delivery, relief of pain, management of the third stage of labor, pelvic damage, and postnatal care.

TABLE I. MATERNAL PULSE RATE

POSITION	BEFORE DELIVERY				AFTER DELIVERY		
	TOTAL	70's	80's	90's ABOVE 100 (AV.)	80's	90's	ABOVE 100 (AV.)
<i>Para i</i>							
L.O.A.	318	182	68	25 43-110	132	95	91-116
R.O.A.	76	40	10	14 12-110	36	20	20-120
L.O.P.	89	32	17	16 24-114	30	17	42-122
R.O.P.	205	88	44	33 40-122	48	63	94-114
<i>Multipara</i>							
L.O.A.	329	209	63	32 25-110	204	74	51-128
R.O.A.	93	58	15	11 9-114	50	21	22-120
L.O.P.	81	41	13	12 15-118	35	20	26-118
R.O.P.	209	131	34	19 25-110	88	70	51-106
SUMMARY							
TOTAL CASES	BEFORE DELIVERY				AFTER DELIVERY		
	70's	80's	90's	ABOVE 100 (AV.)	80's	90's	ABOVE 100 (AV.)
1400	781 55.8%	264 18.85%	162 11.57%	193-115 13.78%	623 44.5%	380 27%	307-118 28.5%

TABLE II. DURATION OF LABOR

POSITION	TOTAL	FIRST STAGE	SECOND STAGE	THIRD STAGE	AVERAGE TOTAL LENGTH OF LABOR
<i>Para i</i>					
L.O.A.	318	10 hr. 38 min.	1 hr. 16 min.	19 minutes	10 hr. 13 min.
R.O.A.	76	9 hr. 50 min.	1 hr. 5 min.	24 minutes	11 hr. 19 min.
L.O.P.	89	16 hr. 4 min.	1 hr. 38 min.	24 minutes	18 hr. 6 min.
R.O.P.	205	20 hr. 8 min.	1 hr. 52 min.	45 minutes	22 hr. 45 min.
<i>Multipara</i>					
L.O.A.	329	6 hr. 38 min.	39 minutes	16 minutes	7 hr. 33 min.
R.O.A.	93	6 hr. 38 min.	51 minutes	19 minutes	7 hr. 48 min.
L.O.P.	81	8 hr. 38 min.	48 minutes	17 minutes	9 hr. 43 min.
R.O.P.	209	9 hr. 7 min.	51 minutes	21 minutes	10 hr. 19 min.

DURATION OF LABOR

From Table II will be noted the different positions with the average duration of labor in each. We estimated the duration of labor from the time that progressive dilatation could be determined. A study of the mechanism and progress of labor showed that in most cases labor is a normal physiologic process. It was evident that the time element, pain, and the ability to wait were the all important factors in management. Prenatal care determined the possibilities of the natal period;

and the maternal pulse rate of 100 or less and normal fetal heart tones indicated the safety of the mother and child. Pain then was our most difficult problem, not only because of the fact that the public has been taught that labor can be shortened and pain eliminated but because of the clinical effect of pain upon the patient. We have therefore been interested not so much in methods that shorten labor as in those safe methods that modify pain.

From the time the patient entered the hospital in labor, was delivered, and was returned to her room, we endeavored to maintain a pulse rate of 100 or less. To do this, the time factor was forgotten and pain was relieved in keeping with the pulse rate. In a former series there were two patients who had convulsions that, from all obtainable information, could be attributed only to pain and exhaustion. I have observed hysterical manifestations are often caused by pain, and definite neuroses originated in labors in which pain was not controlled.

On the other hand, sedatives and anesthetics, when given in too large quantities or over too long periods have produced conditions equally alarming. Labors have been lengthened and we have seen changes in the maternal pulse rate and fetal heart tones that produced unnecessary alarm and interference. The difficulty then was to estimate and utilize the physiologic possibilities of the patient without producing pathologic sequelae. It was very evident from clinical manifestations in the hospital stay and the postnatal period, that the manner in which pain was relieved determined the ultimate recovery of the patient and, therefore, the success of our management of the labor.

TYPE OF DELIVERY

We confess we have been influenced by those who maintain that, since the present-day women demand a shorter labor, the obstetrician should defer to their wishes. But the most outstanding influence has been the delusion that low forceps and episiotomies can be done with safety. The effects of this delusion were seen in the postnatal results observed in the first five or six hundred cases. In our clinical work interference has been so low as 10 per cent and never as high as in our private practice. We have attempted to excuse such a difference on the basis that private patients were different from clinical patients. Yet, if the teaching is followed that interference is indicated only in the interest of the mother or child, two factors obtain in all types of patients. First, the only clinical criterion we have to the condition of the mother, is her pulse rate. Second, the character of the fetal heart is the only known guide to the safety of the child. When these guides were followed, the management of labor in clinical and private patients was essentially the same. (Table III.)

Little excuse can be given for such a large number of midforceps deliveries. In many cases by ironing out the perineum or by aiding ro-

tation, the station was changed and, though the problem had been that of low forceps, yet application was at the midstation and must be classified as a midforceps delivery. Seventy-five versions in such a small series of cases would seem entirely too high. With 40 per cent occiput posterior presentations and a large number of occiput transverse arrests, we believe the majority of versions were indicated. While we have done many versions through the years, nevertheless, we believe that the dangers should prevent the use of this method in all cases where the necessity is not clearly indicated.

By following the pulse rate more closely we were led to lessen all forms of interference, especially in multiparae. We formerly were too much influenced by the misconception that multiparae demand less pain and shorter labors and by the seeming ease with which forceps could

TABLE III. TYPE OF DELIVERY

POSITION	TOTAL	SPONTANEOUS	LOW FORCEPS	MID- FORCEPS	HIGH FORCEPS	VERSION
<i>Para i</i>						
L.O.A.	318	205	84	18	1	10
R.O.A.	76	41	31	2	1	1
L.O.P.	89	24	32	22	1	10
R.O.P.	205	73	75	43	1	13
<i>Multipara</i>						
L.O.A.	329	250	64	12	0	3
R.O.A.	93	65	20	4	0	4
L.O.P.	81	43	17	8	0	13
R.O.P.	209	116	61	21	0	11
SUMMARY						
TOTAL CASES	SPONTANEOUS	LOW FORCEPS	MID- FORCEPS	HIGH FORCEPS	VERSION	
1400	817—58.4%	384—27.4%	130—9.3%	4—0.3%	65—4.6%	

be done. We now believe that, independent of parity or social status, the expectant mother is interested only in the final outcome, and that her attitude toward labor, especially toward interference, is that of her obstetrician.

The management of occiput posterior presentation and deep transverse arrest was the cause of a large part of our interference. An attempt was made to attain the basic essentials of complete dilatation, low station, complete flexion, and rotation. With complete dilatation, but without rotation, if no progress occurred within one hour, and if the pulse rate were as high as 100, a manual rotation was done under gas anesthesia. By following this practice we succeeded in obtaining a spontaneous delivery in 50 primiparae and we now believe others might have been delivered spontaneously had sufficient time been given. A few rotations were done at the midstation when progress was materially delayed, with the patient delivering normally or the presenting point coming down to a low station, making low forceps delivery possible.

Many mental hazards arise when hours have passed with seemingly little progress. The anxiety of friends and relatives may become infectious, and may cause fear rather than reason to direct the course of the delivery. But hours of observation lead to an appreciation of the normal mechanism of labor. Prenatal knowledge that the expectant mother can give birth to her child and the assurance gained from a normal fetal heart and a maternal pulse rate below 100, eliminate fear and make waiting possible. Five hundred and eighty-four occiput posterior presentations were cared for by following these three principles. From our observations of both natal and postnatal results we are becoming more convinced that the only real difference between the management of occiput anterior and occiput posterior positions is the time element, and that the ability to wait patiently is the determining factor in the successful termination of each case. Such waiting can be done intelligently only with adequate knowledge of the patient's well-being as gleaned from close observation including the pulse rate.

THIRD STAGE OF LABOR

Much information was gained from the management of the third stage of labor. The pulse rate was always an infallible guide to the tone, action, and reaction of the uterus, and to final results. If a pulse rate of 100 or less had been maintained, normal contractions returned within a short time and placental separation occurred within the first ten minutes. Loss of blood was reduced to the standard advocated by Calkins, and only gentle force was necessary for the expression of the placenta. In such cases there would not be as much as ten points variation in the pulse rate. On the other hand, with a pulse rate of 100 to 120, from too early attempts at expression of the placenta, or from using undue force, thus adding further tissue insult, the patient would show excessive loss of blood or even shock with alarming changes in the blood pressure and pulse rate. In a few cases the result of such management was to be seen throughout the first week in the hospital. In several patients of this series who were returned to their room with a pulse rate of 100 to 120 after delivery, the cause was traced to poor management of the third stage of labor. Such cases emphasize the importance of a pulse rate continuously below 100 as a guide to safety, and the increasing dangers of too early expression of the placenta. It would seem then that the proper management of the third stage of labor can best be judged by a pulse rate of 100 or less.

PELVIC DAMAGE

A record was made in all cases in which no damage was recorded at the time of delivery and compared with postnatal findings. We feel that these findings disprove the statement so often made that there can be pelvic damage not seen at the time of delivery. This observation has been of special importance, since this teaching has been one of the arguments advocated for routine episiotomy. (Table IV.)

There were 746 episiotomies and tears, many of this number representing the influence of the "routine episiotomy" doctrine. Tears extended beyond the episiotomy frequently, and while the pubococcygeal-sphincter ani relationship was seldom involved, yet in many instances the fascia was damaged. Therefore, we did an anatomic second degree repair after each episiotomy and classified them as second degree tears. There were 10 third degree tears. The rectum itself was involved in only 2 cases, but in all 10 the sphincter muscle was damaged, which necessitates the third degree classification. If the anesthetist reported the pulse rate at the beginning of the repair and at the completion, the pulse rate would often show an increase of as much as ten to forty points.

With proper management of the first stage of labor, and with a trained obstetric anesthetist to assist in the second stage of labor, there

TABLE IV. PELVIC DAMAGE

POSITION	TOTAL CASES	NO DAMAGE	SECOND DEGREE	THIRD DEGREE
<i>Para i</i>				
L.O.A.	318	126	188	4
R.O.A.	76	28	47	1
L.O.P.	89	25	62	2
R.O.P.	205	62	140	3
<i>Multipara</i>				
L.O.A.	329	190	139	0
R.O.A.	92	49	44	0
L.O.P.	81	38	43	0
R.O.P.	209	126	83	0

SUMMARY

TOTAL CASES	NO DAMAGE	SECOND DEGREE	THIRD DEGREE
1400	644—46%	746—53.3%	10—0.7%

should be little change in the pulse rate. The perineal stage most often tests the skill of the obstetrician, but waiting will lessen the indications for an episiotomy. It is true that labor can be shortened by an episiotomy and it is also true that an episiotomy is frequently indicated; yet if a postnatal comparison is made of one thousand cases in which there has been no damage with those in which a routine episiotomy has been done, the difference will be appreciated. From the reports of the White House Conference, it is very evident that attempts to shorten labor with the inevitable pelvic damage are playing an important part in American obstetric morbidity and mortality.

AFTER-CARE

After delivery we have followed a routine of putting a warm blanket over the patient and waiting for complete consciousness before disturbing her in any way. Vomiting seldom occurred and with a well-contracted uterus, bleeding was reduced to a minimum. If absolute rest was then maintained for twenty-four hours, the puerperium would, in

most cases, be normal. If, during labor or during delivery, the pulse had reached 120 for a short time, it would usually return to normal before the patient had been returned to her room. If a pulse rate of 100 or less had been maintained throughout labor, the first week of the puerperium was quite characteristically uneventful. The patients ate and slept well, involution was rapid, and tissue healing was most satisfactory. Catheterization was seldom necessary and few laxatives were required. Most marked was the lack of discomfort and the patient's desire for early exercise. If a repair was done, there was little discomfort or swelling. In other words, if the physiologic balance of the patient had been maintained as expressed by the normal pulse rate of 100 or less, complications of the puerperium were seldom seen. Furthermore tissue reaction and regeneration were found to be in keeping with a continual pulse rate of 100 or less. Most of our cases were examined at the second, fourth, and sixth postnatal months and, in many, the type of labor would be evident in the reparative processes and the ultimate condition achieved.

OTHER CONSIDERATIONS

Few reports are seen from private practice, and I am not certain but that our greatest abuses are to be found in this field. With limited supervision of hospital staffs, much depends upon the integrity and training of the obstetrician. The willingness and ability to observe closely the progress of individual labors should be the measure of good obstetrics.

Divided interest in medicine offers a serious question to be answered. I refer to the combining of other branches of medicine with obstetrics. Only recently, a very well-known obstetrician and gynecologist said to me, "You spend too much time in the hospital." When asked how he managed his patients, he said, "I rupture the membranes in the morning, attend to my surgical work, and by evening there is usually complete dilatation. The interne and nurses have been taught how to care for my patients during this time and to call me when necessary. With complete dilatation I put on forceps, do an episiotomy, and I am through."

Probably this latter statement was truer than he realized. Such statements are frequently heard and such procedure is often seen. With this attitude toward labor it seems imperative to point out once more the basic teaching that the indications for interference are the conditions of the mother and child, which are expressed in the maternal pulse rate and fetal heart tones, and that management must be more nearly directed by these two factors. One who would attain ideals in obstetrics and at the same time engage in other branches of medical practice, should look upon obstetrics as of first importance. In this connection I would advocate that more power be given to the American Board to

the end that it may direct private hospitals to observe the standards it is advocating for obstetricians and gynecologists.

SUMMARY

A study of the cases observed indicates emphatically the conclusions already noted:

First—The necessity of appreciating the relation of good medicine to obstetric problems.

Second—That from the time the patient enters the hospital in labor, is delivered, and returned to her room, the pulse rate should and for the most part, can be maintained at 100, or less.

602 ARGYLE BLDG.

ROENTGEN DIFFERENTIATION OF TYPES OF INTESTINAL VAGINAL FISTULA*

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AN INTESTINAL vaginal fistula is an occasional complication of carcinoma of the female genital tract treated by radiation. Assuming skillful application of radium and x-ray, it arises usually in the cases moderately or far advanced at the time of treatment, and may be due either to postradiation changes or to the advance of the disease. More rarely it follows operative procedures. In all such cases it is important to know the location of the fistula. A fistula may be equally distressing to the patient, no matter where it arises, but the control of the loose stools which are the most disturbing feature, the indications for operation, the nutrition, well-being and perhaps actual survival of the individual, may all depend upon the portion of the bowel communicating with the vagina.

Diarrhea in a pelvic colon fistula may often be controlled by a bland diet and sedatives, but there is no known way successfully to solidify the contents of the small intestine. There is therefore in an ileal vaginal fistula a constant loss of water from the body, and if the fistula is fairly high in the ileum, or the small bowel is irritable and rushes the material through too fast for absorption, there will be a continuous loss of mineral salts and nutrient products of digestion through the fistulous tract. The dietary management of any small intestine fistula is always an exceedingly difficult problem. Where the surgeon therefore is confronted by a difficult or otherwise undesirable operation for closure of a fistula, he is, barring a condition of hopeless malignancy, more or less obliged to attempt to deal with an ileal fistula, while he

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has a wider latitude of choice in a distal colon fistula. A competent gastroenterologist may ameliorate the discomfort of the latter, even to such a degree that the fistula will spontaneously close. The following cases illustrate a simple method of localizing the fistula by barium study of the intestinal tract.



Fig. 1.—Normal colon outline shown by barium enema. No fistula seen.

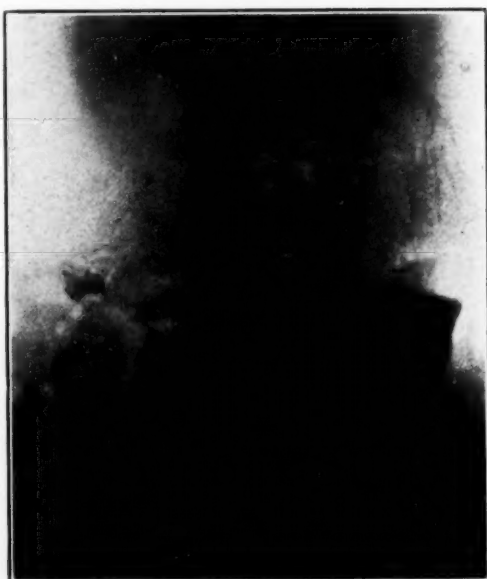


Fig. 2.—One-half hour after barium meal. Very rapid emptying of stomach and upper small intestine.

CASE 1.—This patient had had two operations for ectopic gestation, in 1919 and 1921, with removal of right and left tube and ovary respectively. She came to the clinic of the Woman's Hospital in May, 1928, with carcinoma of the cervix. She was given 2400 mg. hours of radium at that time. In October, 1928, she was operated upon for intestinal obstruction. Masses of ileum were found, matted together in the pelvis. She had a difficult convalescence, with a long stay in the hospital, during which a ureterovaginal fistula developed, with questionable intestinal vaginal fistula. In February, 1930, she had a nephrectomy for pyonephrosis. After this the intestinal vaginal fistula became more troublesome. The patient lost much

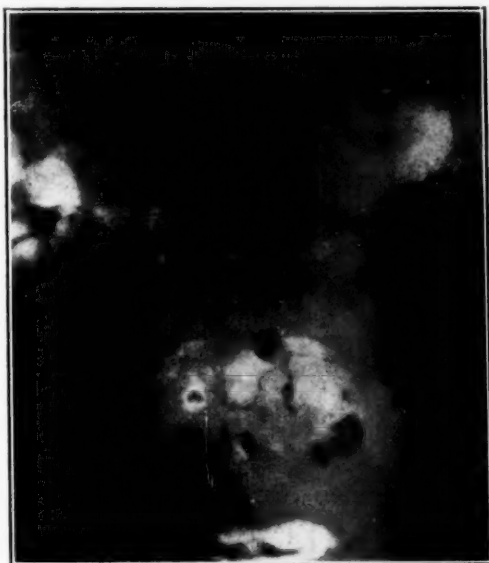


Fig. 3.—Six hours after barium meal. Practically all the barium has run out through the fistula, with none entering the colon.



Fig. 4.—Barium enema given. Very little retained. Fistulous tract shown, communicating with upper pelvic colon.

weight and was very miserable. X-ray studies were made and the fistula localized in the ileum. She was operated upon at her urgent solicitation, though extension of the malignancy was feared. (Cervical carcinoma had apparently healed, following radium two years before.) Metastatic carcinoma in the pelvis, including invasion of ileal coils and the fistulous tract, was found, and the patient died.

The colon is usually examined first, and Fig. 1 shows a normal colon outline. No fistulous tract is seen, and no barium was expelled during the procedure. A second film taken after defecation again showed no evidence of fistula. This postevacuation film is always made, however, as a small fistula may be disclosed under expulsive effort that was not brought out when the barium column was flowing cephalad. The large intestine here being ruled out, a study of the small bowel was made by barium meal. The first film made immediately after barium ingestion showed a normal stomach, but one-half hour later, Fig. 2, it will be seen that the stomach is half empty, representing an extremely rapid outpouring, and most of the material



Fig. 5.—Barium meal. Barium has reached pelvic colon, and fistula, in eight hours, showing marked hypermotility.

has rushed through the duodenum and jejunum into the ileum. A six-hour film, Fig. 3, shows the tract practically empty. All the barium has run out through the fistula, and none has entered the cecum, or passed further into the colon. Thus a diagnosis of ileal fistula is established.

CASE 2.—A young woman, aged twenty-six, entered the Woman's Hospital Cancer Clinic in July, 1926, presenting a carcinoma of the cervix with extension into the left parametrium. She was given 4200 mg. hours of radium. She reentered in November, 1926, with malignant residue on the left posterior lip of the cervix, and extension into the left vaginal fornix, and she was given 3000 mg. hours. She did badly, and in March, 1927, was referred to social service as a hopeless case, and sent to a home for incurables. She reappeared most surprisingly in the clinic some time in 1928, having gained 20 pounds and returned to work. On examination she seemed clinically free from carcinoma, except possibly for a small area in the left broad ligament, which was considered probably due to radium fibrosis, but was marked for careful watching at monthly visits for possible residual malignancy. A suspicion of spread of the process led to high voltage x-ray treatment in 1930, but no further increase has occurred to date. In 1929 a fecal fistula developed.

This was open intermittently at first, but in March, 1931, the patient complained of severe diarrhea and great annoyance from the fistula. At that time there was no evidence of carcinoma recurrence, so with a view to possible closure of the fistula barium studies were made to localize it.

A barium enema was given (Fig. 4) but the colon was so irritable that little barium was retained. The fistula is seen arising from the upper pelvic colon just distal to its junction with the iliac colon. The fistula was therefore located, but in view of the diarrhea, a barium meal was given to study the patient's abnormal hypermotility. Fig. 5 shows a film made eight hours after ingested meal. The barium has reached the pelvic colon, and the fistula, three or four hours ahead of normal average schedule. Following this, however, the barium remained in the



Fig. 6.—Colon outlined by full enema. Fistulous tract concealed behind coils of pelvic colon and rectum.

colon up to seventy-two hours. This last finding offered a valuable hint in treatment. The bland, heavy barium salt acted as a costive, on a patient who had had vigorous purging diarrhea with continuous leakage through the fistula at the time the examination was begun. On an appropriate diet and sedatives, supervised by the gastroenterologist, the diarrhea has ceased, she has slight discharge through the fistula, usually only once a day at time of stool, the opening is smaller, and she has refused operation pending the possibility of complete closure. This patient is clinically free of carcinoma five years after vigorous radiation treatment, although in the earlier stages considered a radium failure.

CASE 3.—A case of adenocarcinoma of the cervix with invasion of both parametria. She had 3600 mg. hours of radium in April, 1931, 225 mg. hours as needles in a small area in August, and a high voltage cycle of x-ray. She developed a fistula.

This case illustrates an important point in technic; namely that it is always desirable to start with a small, rather than the routine large enema. In Fig. 6 the patient had been given, by mistake, a routine enema of an amount sufficient to fill the colon. No fistulous tract can be seen, though barium poured out of the vagina during the entire time of the administration of the enema and the taking of the film. This being discovered, she was returned to the laboratory on a second day, the bowel being first cleansed with nonirritating physiologic saline solution. A second enema, less than a pint, was given, and the fistulous tract disclosed (Fig. 7).

The technic employed in investigating colon fistula is simple. A film is placed under the patient and the machine prepared for instantaneous exposure before the enema is attempted, copious vaginal leakage from a low-down fistula being an annoying handicap which usually increases with every moment the enema is running. A small amount of barium is given, three to six ounces, and a film taken. If insig-



Fig. 7.—Small enema shows fistulous tract between distal end of sigmoid and vagina.

nificant or no leakage has occurred, 6 ounces more is given, and several films made, in oblique and sagittal views. The whole enema is then given, a single large film made, and finally, and of great importance, another film is exposed after the patient has been allowed to evacuate as much as possible of the clyisma. As noted above, small fistulas are sometimes brought out only on expulsive effort.

Where it is necessary to study an ileal fistula by barium meal, the usual roentgenologic procedures are carried out, except that little attention is usually paid to the stomach, and films of the small intestine are made at intervals of one to two hours, until the ileum is empty and the presence or absence of an ileal vaginal fistula proved. The actual fistulous tract between ileum and vagina is much less likely to be visualized than between vagina and pelvic colon, the ileal coils being less fixed in location and less easy to separate and identify in the film image. A fistula is inferred in the small intestine when much or all of the material disappears from the ileum out through the fistula rather than

into the large intestine. Fluoroscopy may often be done to advantage in either case, but we do not practice it routinely because of the annoyance of vaginal leakage. In an obscure case it should invariably be done.

30 EAST FORTIETH STREET.

BENIGN UTERINE HEMORRHAGE TREATED WITH RADIATION THERAPY, WITH A REVIEW OF 147 CASES*

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DURING the period 1925-1932 there were referred to the Radiation Therapy Service from the Gynecological Division 147 cases of benign uterine bleeding. Only those patients were chosen for this study upon whom careful pelvic examination showed no palpable gross pathology; i.e., malignancy, fibroids, adnexal disease, or ovarian cysts, and where diagnostic curettage eliminated the presence of polyps and submucous fibroids.

The pathologic changes occurring in these cases were situated either in the endometrium, myometrium, or ovaries. Reviewing the pathology in 66 cases of their series, Novak and Martzloff¹ found that, grossly, the endometrium was thickened in the majority of cases, and that microscopically, there was a hyperplasia of the glandular, epithelial, and stromal elements. Large distended glands close to small and narrow ones yielded a picture which they designated "Swiss cheese" pattern. Shaw² states that the endometrium may be hyperemic and edematous rather than hyperplastic. Shaw² further suggests that the myometrium may be greatly hyperplastic, while Theilhaber³ states that the uterine musculature may be replaced by connective tissue, and Anspach⁴ believes that there is an abnormal distribution of elastic tissue about the blood vessels.

TABLE I. HISTOLOGIC DIAGNOSES OF 70 CASES OF CURETTAGE

AGE GROUP	NORMAL ENDO- METRIUM	ENDO- METRIAL HYPER- PLASIA	ADENO- MATOID HYPER- PLASIA	ATROPHIC ENDO- METRIUM	TUBERCU- LAR ENDO- METRIUM	UN- KNOWN
Young Age						
12-25	2	0	0	0	0	1
Middle Age						
26-40	8	5	6	0	1	2
Menopausal Age						
41-65	9	16	16	2	0	2
Total	19	21	22	2	1	5

*Read before the Section of Gynecology and Obstetrics, New York Academy of Medicine, January 24, 1933.

The most conclusive work of the ovarian changes is that presented by Schroeder⁵ who demonstrated the presence of numerous small follicular cysts which he described as intact unruptured follicles. In addition, he found little or no evidence of corpus luteal formation. He concluded that these persistent unruptured follicles produced a prolonged proliferative stage in the endometrium.

Whatever may be the underlying etiologic factor producing these pathologic changes, we can but agree with Novak, Martzloff and Shaw that there occurs a generalized endocrine disturbance in which the ovaries play a leading part. In our series curettage showed endometrial involvement in most cases.

For the purpose of better study, the 147 cases were divided into three arbitrary groups:

1. *Young Age Group*.—Twelve to twenty-five years, 16 cases. Of these, 3 patients had had a previous diagnostic curettage, and 1, in addition, a suspension of the uterus with no improvement of the bleeding condition. All these patients were treated by high voltage x-ray therapy and in several an additional radium application was given. Table II gives a summary of the amount, the location of the treatment administered, and the results obtained.

An analysis of these results shows that excessive bleeding was controlled in all cases. Normal menstrual cycles were resumed by 11 patients, 2 of whom received irradiation to the pituitary and spleen alone. The remaining 5 patients had an amenorrhea imparted, which, however, because of the brief interval which has elapsed since treatment, cannot be called permanent.

2. *Middle Age Group*.—Twenty-six to forty years, 44 cases. Of these, 17 patients were operated upon, bleeding, however, not being controlled. Table III outlines the therapy administered and the results obtained.

3. *Menopausal Group*.—Forty-one to sixty-five years, 87 cases. In 45 instances curettage was performed, 18 prior to and 27 at the time of radiation treatment. In addition, uterine suspension was done in one case, and operation for cystic ovaries in two cases. In none of these cases, however, was bleeding controlled. Both x-rays and radium were used in 8 cases in this group because there was a suspicion of malignancy although this was not shown in the curettements. Following irradiation, permanent artificial menopause resulted in 83 cases; in the other 4 cases normal menstruation was resumed later (Table IV).

Our results are in accord with the general opinion that radiation therapy is the treatment of choice for benign hemorrhage in patients at the menopausal age. Because of the fear that a permanent sterilization may result from irradiation, there has been a reluctance on the part of gynecologists to subject the younger age group of patients to this form of therapy. But Polak⁶ treated 31 young girls with radium and in every instance menstruation later resumed a normal cycle. Simi-

TABLE II. YOUNG AGE GROUP TWELVE TO TWENTY-FIVE YEARS

CASE NO.	AGE	FIRST TREATMENT X-RAYS	RESULTS OF FIRST TREATMENT			SECOND TREATMENT X-RAYS OR RADIUM	RESULT OF SECOND TREATMENT		THIRD TREATMENT RADIUM	FINAL RESULT	
			AMENORR.	CONT'D MENSES	RESUMED MENSES		AMENORR.	RESUMED MENSES		AMENORRHEA	MENSTRUATION
1	12	Pelvis 75%	*	Mod.*	Reg.*	Pelvis 25%	*	Reg.*			*
2	12	Pelvis 50%		Irreg.*							*
3	13	Spleen 25%	*		Reg.*						*
4	14	Spleen 25%	*		Reg.*						*
5	14	Pelvis 100%	*		Reg.*						*
6	15	Spleen 25%	*		Reg.*						*
7	15	Spleen 25%	*		Reg.*						*
8	16	Spleen 50%	*	Profuse* Irreg.	Reg.*	Radium 1000 mg. hrs.	*	Reg.*			*
9	16	Spleen 50%	*		Reg.*						*
10	17	Pelvis 50%	*		Reg.*						*
11	19	Pelvis 50%		Profuse Irreg.*		Radium 720 mg. hrs.	*	Profuse* Irreg.	Radium 600 mg. hrs.	*	For only 3 mo.
12	20	Spleen 25%	*							*	For 16 mo.
13	21	Pelvis 100%	*							*	For 6 mo.
14	21	Pelvis 75%	*							*	For 4 mo.
15	22	Pelvis 25%	*	Profuse*		Pelvis 100% Spleen 25%	*			*	For 36 mo.
16	22	Pituitary 30%	*	Reg.*							*
17	25	Pelvis 100%	*		Reg.*						*
18	25	Pelvis 75%		Profuse*		Radium 1600 mg. hr.	*	Scant* Irreg.			*
Total 16			10	7	7	5	5	4	1	5	11

*Positive results, bleeding controlled.

TABLE III. MIDDLE AGE GROUP TWENTY-SIX TO FORTY YEARS

NUMBER OF CASES	FIRST TREATMENT	RESULT OF FIRST TREATMENT			SECOND TREATMENT X-RAYS	RESULT OF SECOND TREATMENT AMENORRHEA	FINAL RESULTS	
		AMENORRHEA	CONTINUED TO MENSTRUATE	RESUMED MENSTRUATION			AMENORRHEA	MENSTRUATION
32	X-rays only Pelvis 100%	30	2 regular	(6) 3 regular 3 irregular	1 Pelvis 100%	1	25	7
6	Radium only 700 mg. hr. 1400 " " 1700 " " 2100 " " 2300 " " 2600 " "	6	0	2 irregular	1 Pelvis 100%	1	5	1
5	X-rays Pelvis 100% Spleen 25%	5	0	2 regular	0	0	3	2
1	X-rays Pelvis 50% Radium 2800 mg. hr.	1	0	0	0	0	1	0
Total 44		42	2	10	2	2	34	10

TABLE IV. MENOPAUSAL AGE GROUP FORTY-ONE TO SIXTY-FIVE YEARS

NUMBER OF CASES	FIRST TREATMENT	RESULTS OF FIRST TREATMENT			SECOND TREATMENT	RESULT OF SECOND TREATMENT	FINAL RESULTS	
		AMENORRHEA	CONTINUED TO MENSTRUATE	RESUMED MENSTRUATION			AMENORRHEA	MENSTRUATION
68	X-rays to pelvis 100%	67	1 profuse	2 regular	1 X-rays to pelvis 50%	1	66	2
10	Radium alone 3500 mg. hr. (average dose)	10	0	0	0	0	10	0
6	X-rays to pelvis 100% Radium 3900 mg. hr. (average dose)	6	0	1 scant	0	0	5	1
1	X-rays to pelvis pelvis 100% spleen 25%	0	1 profuse	0	1 Radium 2500 mg. hr.	1	1	0
2	X-rays to pelvis 100% spleen 25% Radium 1100 mg. hr.	1	1 regular	0	0	0	1	1
Total 87		84	3	3	2	2	83	4

TABLE V. PROBABILITY CHART

AGE GROUP	NO. CASES	AVERAGE TIME OF RESUMPTION	CONTINUED TO MENSTRUATE OR RESUMED MENSTRUATION	CASES OF AMENORRHEA FOLLOWED OVER AVERAGE TIME OF RESUMPTION	TOTAL CASES FOLLOWED OVER AVERAGE TIME OF RESUMPTION	PERCENTAGE PROBABILITY OF MENSES FOLLOWING THERAPY	CASES OF AMENORRHEA FOLLOWED BELOW AVERAGE TIME OF RESUMPTION
12-18	8	5.3 months	8	0	8	100%	0
19-25	8	14.5 months	4	1	5	80%	3
26-32	13	6.8 months	6	2	8	75%	5
33-39	25	9.7 months	7	6	13	53.8%	12
40-46	57	9 months	4	35	39	10.3%	18
47-53	32	8 months	2	22	24	8.3%	8
54-60	2	0	0	2	2	0%	0
61-67	2	0	0	22	2	0%	0
Totals	147				101		46

larly, a 100 per cent resumption is cited by Norsworthy⁷ whose 13 cases of adolescent hemorrhage were treated with radium. Less striking results, but nevertheless sufficiently encouraging, are reported by Neil⁸ who had 24 patients resume normal menses, in a series of 30 cases. Even beyond the arbitrary adolescent group, Stacy⁹ reported only 6 cases of permanent amenorrhea out of 122 patients below the age of thirty-five. It is evident, therefore, that this fear of permanent amenorrhea is quite unwarranted.

In order to determine the relative percentage of the likelihood of either continuing or resuming menstruation after a first series of radiation therapy, we have arbitrarily divided the 147 cases on our charts into eight smaller groups covering a six-year time interval. From our study of these cases we have deduced the data making up Table V, showing the probable duration of amenorrhea in all but 46 of the patients, who were too recently treated.

CONCLUSIONS

1. Radiation therapy was successful in controlling all cases of uterine hemorrhage.
2. In a number of the cases, curettings were histologically normal, which leads us to believe that some endocrine disturbance was at the root of the bleeding.
3. Some patients resumed menstruation while others of the same age and receiving the same type of therapy became permanently amenorrheic.
4. In the young age group, a second irradiation treatment is required more frequently than in the older groups to control bleeding.
5. There is a progressive decline in the chances for resumption of menstruation from the younger to the older group.

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WEIGHT CHANGES IN THE LAST FOUR MONTHS OF PREGNANCY*

A STUDY BASED UPON 663 CASES OF NORMAL PREGNANCY AND PREGNANCY COMPLICATED BY TOXEMIA

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ALTHOUGH the literature contains many studies of the weight change in pregnancy, especially regarding its relationship to the late toxemias, there is little data which can be applied in actual practice. The clinical value of most of the conclusions drawn from these studies is obviously uncertain due to the paucity of material, or the fewness and irregularity of observations, or the circumstances under which the weights were taken.

In order to obtain further and more practical data on weight changes in the last four months of pregnancy, and the causes of variations, we have selected and studied 663 suitable case records of private patients who were attended by us at several Detroit hospitals during the last eight years. The records of the 624 normal patients were studied first. These patients were all of the white race, in the vast majority native born, with no economic necessity for restriction in diet, and were delivered within two weeks of the expected date, calculated from the last menstrual period. We did not consider slight or moderate edema of the extremities an abnormality in itself, since it is so nearly universally present in the latter months of pregnancy.

The normal series was further restricted to patients who were weighed at the twenty-fourth, twenty-eighth, thirty-second, thirty-fourth, thirty-sixth, and thirty-eighth weeks. From these weights were calculated the weight changes for the seventh and eighth lunar months of pregnancy and for each two weeks' interval thereafter until the thirty-eighth week. Only 460 were weighed early in labor or within a few days of its onset so as to determine the change in the last two weeks. In Table I are shown the average gains in pounds for the various periods and the average total for the last four months of pregnancy.

Further examination of the material quickly showed that these figures were of little or no significance, since deviations from the averages were many and extreme. Table II shows the distribution of

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TABLE I. AVERAGE NORMAL WEIGHT GAIN

WEEK	24-28	28-32	32-34	34-36	36-38	38-40	TOTAL
Pounds gained	4.4	3.9	2.0	2.1	2.0	1.3	15.7

gains and losses for the different periods, and Table III gives the variations in the total gains of those weighed throughout the last four months.

TABLE II. DISTRIBUTION OF WEIGHT CHANGES BY PERIODS

WEEKS:	24-28	28-32	32-34	34-36	36-38	38-40
Lost weight	11	15	33	43	62	110
Gained weight						
0-1 pounds	15	41	79	82	88	74
1-2 pounds	40	54	151	142	132	76
2-3 pounds	72	83	175	149	157	75
3-4 pounds	97	85	111	114	76	44
4-5 pounds	116	133	52	57	63	40
5-6 pounds	105	72	16	19	20	21
6-7 pounds	71	77	5	12	16	11
7-8 pounds	39	29	0	7	6	3
8-9 pounds	29	24	1	0	2	4
9-10 plus	29	11	1	0	2	2

TABLE III. DISTRIBUTION OF TOTAL WEIGHTS

NO. PATIENTS		NO. PATIENTS	
Lost weight	2	16-20 pounds	121
Gained weight		20-24 pounds	70
0-4 pounds	8	24-28 pounds	30
4-8 pounds	27	28-32 pounds	6
8-12 pounds	77	32-36 pounds	3
12-16 pounds	113	36 plus pounds	3

In an attempt to explain these differences, several possible factors were considered. Parity, age, and body build, or ratio of weight to height, have been considered as modifying influences by most writers. Parity was studied first, and in Table IV are given the average gains for women in the first and second pregnancies and for those in the third and succeeding pregnancies.

TABLE IV. AVERAGE PERIODIC WEIGHT CHANGES ACCORDING TO PARITY

WEEKS	PARA I	PARA II	PARA III PLUS
24-48	4.5	4.5	4.1
28-32	4.1	3.8	3.4
32-34	2.0	2.1	1.7
34-36	2.2	2.0	1.8
36-38	2.1	1.8	1.8
38-40	1.2	1.5	1.5
Total	16.1	15.7	14.3

Apparently, the greatest average gain occurs in the first pregnancy. Each succeeding pregnancy shows a slightly smaller gain. These relatively slight differences, however, in no way explain the wide variations shown in Tables II and III. In fact, a table, which is not shown here, made out for the different parity groups showed as much variation from the averages as did Tables II and III for the entire series.

To investigate the influence of age upon weight changes, three groups were studied as follows: (1) Those less than twenty-five years of age. (2) Those who were twenty-five and less than thirty-five years of age. (3) Those who were thirty-five years of age or older. The average gains for the three groups were, respectively, 17.9, 15.8, and 12.3 pounds during the last four months of pregnancy.

It was at once evident that age might also be the factor responsible for the differences associated with parity since primiparas, for instance, would naturally tend to be younger than those who had already had several pregnancies. The actual percentage incidence of young, medium-aged, and elderly women for the primiparas was 31, 61, 8; for secundiparas 11, 71.5, 17.5; and for tertiparas and above was 0, 72, 28. Table V shows the average in the different periods for these parity groups, subdivided according to age. Parity alone, evidently, has little influence, while age is an important factor.

TABLE V. AVERAGE PERIODIC WEIGHT ACCORDING TO PARITY AND AGE

WEEKS	24-28	28-32	32-34	34-36	36-38	38-40	TOTAL
<i>Age</i>							
<i>Para i:</i>							
--- 25 yr.	5.1	4.6	2.2	2.4	2.3	1.1	17.7
25 to 35	4.3	3.9	2.0	2.3	2.2	1.3	16.0
35 ---	3.3	3.2	2.3	1.3	1.2	1.0	12.3
<i>Para ii:</i>							
--- 25 yr.	5.6	4.3	1.9	1.9	2.1	3.3	19.1
25 to 35	4.5	4.0	2.0	2.1	1.7	1.2	15.5
35 ---	3.4	3.3	2.4	1.7	2.1	0.9	13.8
<i>Para iii:</i>							
--- 25 yr.	--	--	--	--	--	--	---
25 to 35	4.7	3.6	1.8	1.8	1.8	1.9	15.6
35 ---	2.7	2.7	1.5	1.6	1.6	0.8	10.9
<i>Whole Group</i>							
--- 25 yr.	5.2	4.5	2.1	2.3	2.3	1.4	17.8
25 to 35	4.4	3.9	1.9	2.1	1.9	1.4	15.7
35 ---	3.1	3.1	2.0	1.5	1.6	0.9	12.2

For the consideration of body build, or the relationship of weight to height, on weight changes during pregnancy, there were 351 cases with suitable observations for study. These patients were divided into three groups: (1) slender, up to two pounds per inch of height; (2) medium, from two to two and one-half pounds; and (3) stout, two and one-half pounds or more per inch. The total gains for

the three groups were 16.2, 15.8, and 15 pounds, thus indicating a slight tendency for increase in total gains during the last four months for the more slender women.

These height-weight ratio groups were subdivided according to the age groups mentioned above, and the average total gains for each of the periods of pregnancy are shown in Table VI. Here it is noted that the young women and those of medium age show little difference, other than that explained by age; while the older women seem to gain definitely less when stout, though we feel that this should not be emphasized because the data are obtained from an analysis of a relatively small group of cases (45).

TABLE VI

WEEKS	24-28	28-32	32-34	34-36	36-38	38-40	TOTAL
<i>Young (71):</i>							
Slender	5.9	4.5	2.1	2.4	2.7	0.9	18.5
Medium	5.6	4.5	2.2	2.2	1.9	1.9	18.1
Stout	5.9	5.1	2.0	1.8	3.1	0.3	18.2
<i>Medium Age (235):</i>							
Slender	4.7	3.7	2.1	2.3	1.8	1.2	15.8
Medium	4.6	3.8	2.0	1.8	2.1	1.4	15.7
Stout	4.4	3.0	1.9	2.4	2.2	1.3	15.2
<i>Elderly (45):</i>							
Slender	4.2	4.6	2.3	1.2	1.1	1.9	15.3
Medium	2.8	3.3	2.7	1.5	1.4	0.7	12.4
Stout	1.8	3.0	2.1	1.1	2.1	1.4	11.5

DISCUSSION

The foregoing tables appear to show that age is of considerable importance as a factor in weight changes during the last four months of pregnancy, while parity and body build are of slight or questionable influence. Any attempt, therefore, to establish normals for weight gain during pregnancy should take into consideration the age of the patient.

While age appears to be the most important factor, it must be borne in mind that these are *averages* computed from figures showing wide variations in weight changes within the groups, ranging from actual weight loss to twice the average gain. Such averages, therefore, are of value as indicating a group tendency rather than the normal expectancy of the individual of a certain age. It should be stated here that in instances where there was a marked tendency toward one extreme or the other, effort was made at correction by changes in caloric intake. Otherwise, even greater and more frequent variations might have occurred.

Zangemeister's observation that weight loss occurs prior to the onset of labor is confirmed to some extent in our series. This was observed during the last two weeks of pregnancy in 110 of a series of 460 patients (23.9 per cent).

TOXEMIAS

For the investigation of the weight changes in toxemias of pregnancy, there were available for study 39 cases. Questionable toxemia was excluded by considering only those cases which showed hypertension of at least 140 mm. mercury systolic and definite albuminuria. The majority of these patients showed varying degrees of edema, although this sign alone, regardless of degree, was not considered pathognomonic of toxemia in the absence of hypertension and albuminuria.

There is a general clinical impression supported by statements in the literature that late toxemias are usually associated with excessive gain in weight due to edema. In this series the total average gain was 20.9 pounds as compared with 15.7 pounds for the normals, this increase in the cases with toxemia being due to a high case frequency of excessive gain at one or more observation periods. For practical purposes we considered an excessive gain to be twice the normal average, according to age (whole group, Table V). Using this criterion it was found that 28, or 72 per cent, of the toxemic patients gained excessively at one or more periods. Those who showed no excessive gain were all of the preeclamptic type, and usually the toxemias of mild or moderate severity.

Investigation regarding the time of occurrence of this excessive gain in relationship to the onset of toxemia showed that it was first noted one or more periods before the first definite sign of toxemia (usually hypertension) in 17 or 43.7 per cent of the cases; coincided with the appearance of the first sign of toxemia in 6 or 15.5 per cent; and was noted only after the onset of toxemia in 5 or 12.8 per cent. As stated before, 11 or 28 per cent of the cases showed no excessive gain. There were four cases of eclampsia. Each one of these patients gained excessively at one or more periods during the last four months; in two cases the excessive gain preceded and in two cases the gain coincided with the appearance of the first sign of toxemia.

The foregoing suggested that regular weighing might be of value in anticipating a considerable portion of toxemia cases, since in more than two-fifths (17) there was an excessive gain preceding definite signs of the disease. Contrary to our expectation, this was found not to be the case, for in the complete series there was the large group of 280 with a similar gain of at least twice the average in one or more periods who completed pregnancy without any sign of toxemia. Combining the figures we have a group of 297 available for the prediction, if possible, of toxemia on the basis of excessive weight gain. Actually, only one in seventeen developed toxemia, essentially the same incidence as for the whole series of 663 patients.

SUMMARY

Weight changes calculated from periodic observations during the last four months of pregnancy showed many and extreme variations from the average. Parity and body build (height-weight ratio) had little or questionable influence in causing these variations. Age had some effect (younger women gaining more than older) regardless of parity and body build, but failed to explain most of the deviations from the average.

Excessive gain at some period or periods was noted in the majority of patients with late toxemia of pregnancy. It occurred before the onset of definite signs in two-fifths of the toxemia cases but was also found to occur with the same frequency in normal pregnancy. Therefore, in this relatively small series, excessive weight gain appeared to be of questionable clinical value in the early recognition of impending toxemia.

955 FISHER BUILDING.

ACUTE INVERSION OF THE UTERUS, WITH A REPORT OF
FOUR CASES*

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ACUTE inversion of the uterus has been noted in the Methodist Hospital only four times since the beginning of the Department of Obstetrics in 1906, during which time there have been 26,000 deliveries, giving an incidence of one inversion to each 6,500 cases.

For convenience of description we have divided these four cases of acute inversion of the uterus into two groups: (1) The sudden or expulsive inversion, two cases, and (2) the acute delayed or gradual inversion, also two cases.

As representative of the first group we have Mrs. K., para ii, white, aged twenty, due Dec. 10, 1926, with a history of a seven months' baby after a short normal labor, one year previously. She first visited the antepartum clinic in the sixth month of the present pregnancy. Her initial examination showed poor general condition and bad teeth. At her second visit three weeks later she had a blood pressure of 140/90, and a heavy trace of albumin. She was placed on anti-toxic régime. In the eighth month her blood pressure remained high with marked albuminuria. Hospitalization was advised but refused. This patient was admitted to the hospital, very toxic, ten days before term on Nov. 30, 1926. On the same day a 6 pound 6 ounce child was delivered spontaneously after one hour and fifteen minutes of labor. Following the second stage, five minims of pituitrin were given, the placenta was expressed with difficulty after thirty-three minutes; one ampule of gynergen was given at once which did not control bleeding; hence, five minutes later one ampule of pituitrin was given. This was followed by strong contractions

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of the uterus. The patient was returned to the ward in fair condition, but it was soon noticed that she was in shock and was bleeding rather profusely. An attendant who was in the hospital, immediately examined her and made a diagnosis of inversion of the uterus, and under light anesthesia the uterus was reinverted without difficulty. The uterine cavity was packed with gauze, saline infusion given, but the patient died from the extreme shock before a transfusion could be accomplished.

CASE 2.—Group 1, a para ii, white, aged twenty-eight, whose first child was born two years previously without difficulty, was admitted to the hospital at term. A 9 pound child was delivered with prophylactic forceps, after two hours and twenty-four minutes of labor. One ampule of pituitrin was given immediately and the placenta expressed without difficulty eight minutes after birth of the child. This was followed by one ampule of pituitrin and the patient returned to bed with the fundus well contracted and no bleeding. At end of one hour, because of a relaxed fundus, one ampule each of pituitrin and aseptic ergot was given. One-half hour later the patient was actively bleeding; the pituitrin and ergot were repeated, after which the bleeding became profuse and the patient was shocked. The vagina was packed, infusion of saline was given and a donor for transfusion was obtained, but the patient died before the transfusion could be effected. The diagnosis of acute inversion was made while packing the vagina for control of the bleeding.

As representative of Group 2, the gradual or delayed type of inversion, we have Case 3, a para i, aged twenty, white, admitted to the hospital at term. A five pound child was delivered spontaneously one hour and fifty-eight minutes after the onset of labor. One-half ampule of pituitrin was given immediately and the placenta expressed sixteen minutes later without difficulty. Following this, injections of one ampule each of pituitrin and aseptic ergot were given. This medication was repeated twice at hourly intervals because of a soft fundus and moderate bleeding. Following the last dose, the patient bled profusely and her condition became alarming. The vagina was packed, a hypodermoclysis given, followed later by a transfusion with marked improvement in her condition. On the eighth day, because of a low grade temperature and profuse sanguinous lochia, a vaginal examination was done and a complete inversion of the uterus discovered. Transfusion was repeated and manual reduction of the uterus under deep ether anesthesia, was performed with considerable difficulty. After replacement, the uterine cavity was packed with gauze. This was removed after forty-eight hours and a rapid recovery followed. This patient has had no subsequent pregnancy.

CASE 4 of this second group is Mrs. B., a para i, white, aged twenty-eight, admitted to the hospital at term, having a moderate funnel pelvis. After eleven hours of labor, a seven and one-half pound child was delivered with low forceps. Five minims of pituitrin were given immediately and five minutes later the placenta was easily expressed. One ampule each of gynergen and pituitrin was given at the completion of the third stage. One hour later a relaxed uterus with abnormal bleeding was reported, the pituitrin was repeated. On the tenth day because of a low grade temperature, inability to void and a profuse lochia, a vaginal examination was done and a complete inversion of the uterus found. Under deep ether anesthesia the inversion was readily reduced by manual manipulation. Following this, the uterus was packed with gauze. The packing was removed in forty-eight hours. This patient had an uneventful convalescence. It is interesting to note that one year later this patient aborted in the fifth month and had a severe postabortal sepsis.

Many theories have been advanced regarding the etiology and mechanism of acute inversion. McCullough has shown it to occur about equally in multiparous and primiparous women. It is a generally accepted fact that in order for an acute inversion to occur we must have a relaxed or unequally contracted uterus. These prerequisites may be found in varying degrees in most postpartum uteri, from several causes, the most important of which we believe to be an isolated area of muscular relaxation or unusual relaxation of the lower segment from poor muscle tone.

If the uterus is carefully palpated immediately postpartum, an area which is soft and indentates easily can often be located. This softness may be due to physiologic inertia of the placental site, muscular incoordination, or disturbance in the conductive mechanism of the uterus, but regardless of the etiology it is subject to action from the contiguous well contracted muscle. Unusual relaxation of the lower uterine segment from poor muscular tone we believe to be present in most of the women who deliver their babies very rapidly, particularly the multiparous woman. Both of our multiparous cases were of the expulsive type of inversion. Their average duration of labor to complete dilatation was less than two hours.

The fact that some uteri will invert themselves through any opening that will permit has been impressed on us recently by two cases. On opening the abdomen of a case of ruptured uterus through an old cesarean scar, we found the fetus and placenta free in the abdominal cavity and the uterus completely inverted through the old line of incision. In another cesarean section, there was some delay in closing the uterine wound. During this delay the fundus became soft, hence one ampule of pituitrin was injected directly into the uterine muscle. In an incredibly short time there occurred a complete inversion through the line of incision in the uterus.

The factors necessary for the production of an inversion are present without importance in the majority of instances, but may serve as predisposing causes, in the presence of extraneous forces such as fundal pressure, funic traction, or following the administration of oxytocic agents, especially pituitrin. Judging from the number of cases appearing in the literature, the incidence of acute inversion of the uterus has apparently increased, since the introduction of this hormone into the practice of obstetrics about 1909. We feel that any rapidly acting oxytocic agent of which pituitrin is the most striking example, may play an important part in acute inversions of the uterus. With this thought in mind, we would like to remind you of a few well-known clinical facts concerning the action of this drug, viz., that the response to pituitrin varies with the susceptibility of the individual patient, a small dose producing little effect in one uterus and

tetanic contractions in another. Furthermore, the reaction is more marked in those cases where the musculature has not been fatigued by long labor, and in all cases the action is greatest in the thick fundal portion of the uterus, the thin lower segment having less muscle tissue does not therefore react so readily to pituitrin. Clark has shown experimentally that the uterine contractions originate somewhere near the cornu and travel from above downward. This may be demonstrated at any cesarean section for when pituitrin is injected directly into the uterine muscle, the blanching, which denotes the onset of the contraction, is most marked in the fundus and proceeds downward. Thus we see how easily an inversion could occur with an overstimulated fundus and a relaxed lower segment.

We have noted that each of our four patients was given pituitrin immediately following the birth of the child. Pituitrin given at this time unquestionably causes more rapid separation and expulsion of the placenta, and there is no objection whatever to its use for this purpose, if we remember that it may render the muscle more susceptible to subsequent or repeated large postpartum dosages.

In our two cases of the expulsive type we consider that the individual susceptibility of the patient to pituitrin was so great that the vigorous action of the stimulated muscular fundus caused herniation of the upper portion through the relaxed lower segment, which had not had sufficient time to recover even a part of its normal tone. In Case 1, considerable fundal pressure was made in order to expel the placenta. This possibly indented the fundus to a considerable extent, which indentation became an inversion when the uterus was stimulated with pituitrin. We feel that the sudden type of inversion is more apt to occur in the multiparous woman because of her more relaxed lower segment.

In the two cases of the gradual type both of which were primiparous, we think that the frequently repeated injections of pituitrin at such short intervals, together with inexperienced handling of the fundus, may have produced a violently contracting muscle which gradually invaginated its relatively relaxed area, perhaps the placental site, through the less resistant lower segment to the extent of a complete inversion. We would expect the gradual inversion to occur more frequently in primiparous women as they are more likely to have the placenta situated in the fundus. It is our routine practice at the Methodist Hospital to regularly palpate but not massage the fundus during the third stage of labor, and all fundi are held by a nurse one hour following the completion of the third stage.

While the theoretical factors concerned in causing this condition are most interesting, there are a few practical points that are impressive. For example, the predominating symptoms, shock and hem-

orrhage, were present in three of the four cases, the severity varying in proportion to the suddenness with which the inversion took place and the amount of bleeding. In the expulsive group the shock and hemorrhage were of sufficient severity to cause death, while the delayed group showed little shock because of the more gradual occurrence of the inversion. The subjective symptoms following the acute stage in the two patients that survived, were a septic temperature with profuse lochia and bladder or rectal disturbance. None of our patients had pain after the inversion occurred. Failure to bear in mind the possibility of inversion of the uterus causes delay in making the diagnosis. Any postpartum case that shows undue shock in proportion to the blood loss, or continues to bleed postpartum should be examined with this condition in mind. The diagnosis is made by finding a pedunculated tumor in the vagina. The question as to the nature of the tumor is settled in thin women by abdominal palpation, which reveals the fundus absent with the characteristic cup-shaped mass occupying its position. In stout women abdominal palpation is often unsatisfactory; in such cases rectal examination will reveal a complete absence of the uterus above the vaginal mass. Jones has called particular attention to the tubal openings as a diagnostic point, but we were unable to demonstrate this finding in our cases, because of the edema and bleeding which is generally present in the acute case.

Interference with the normal mechanism of the third stage of labor we feel to be the cause of most of the complications encountered after delivery and particularly of acute inversion. After expulsion of the placenta and administration of pituitrin, the fundus should be held high in the abdomen, applying suprapubic pressure as described by Dickinson until the muscle is equally contracted and the lower segment has sufficient time to recover its tone.

As our knowledge of the causation and management of acute inversion of the uterus has increased, the mortality rate has been materially lowered. In 1910 a series of cases were reported with the remarkably high mortality rate of 70 per cent, while Findley in 1929 states that the rate should not exceed 3 per cent. The reduction of this rate has been accomplished by more astute diagnostic acumen, transfusion, strict asepsis and waiting for reaction from shock before replacing the uterus. Watson has pointed out that the infrequent occurrence of acute inversion has prevented a large experience by any one obstetrician and this fact may account for the tardy recognition of the danger in replacing an acute inversion in the presence of shock. Hoover in a collected series reported that in 79 cases of replacement performed in the presence of shock, the mortality was 30 per cent, while in 47 cases of the same type where the operation was postponed until the patient had reacted from shock, the mortality was 5 per cent.

In our group, Case 1 was possibly lost because of her poor general condition due to toxemia. We now believe that it would have been wiser to wait for a transfusion and improvement of the shock before replacing the uterus. The other mortality was probably due to delay in the institution of appropriate treatment. Earlier diagnosis and more prompt treatment perhaps would have saved her life.

If a diagnosis of acute inversion is made before the intervention of shock, the inversion may be replaced immediately. In the presence of severe shock, however, the vagina is best packed, the patient transfused and no other manipulation attempted until the shock has been overcome.

Huntington and Kellogg have up to the present time replaced seven cases of inversion of the uterus by the abdominal route without difficulty, but judging from the ease of replacement in our small number of cases, we feel that practically all acute inversions can be manually reduced through the vagina. Considerable patience, good anesthesia, and plenty of time are required for this method. Gaudino's success in replacing an inversion under spinal anesthesia after other methods had failed is worthy of note.

From this study the following conclusions seem justified:

1. That susceptibility to the action of oxytocic drugs in uteri with unequally contracted muscle or relaxed lower segment may be the direct factor in the production of an inversion.
2. That repeated doses of oxytocic drugs postpartum may complete a partial inversion which has been started by the inexperienced manipulation of the fundus.
3. That transfusion is the most efficient measure in combating the shock and hemorrhage that invariably accompanies acute inversion.
4. That replacement of the inversion should not be attempted until the patient has thoroughly reacted from the effect of shock and hemorrhage.
5. That most acute inversions of the uterus can be replaced by vaginal manipulation, and we feel that packing of the repositied uterus is a factor in preventing reinversion.
6. That the possibility of acute inversion should be borne in mind in cases of severe or prolonged postpartum bleeding.

URINARY SUPPRESSION AND UREMIA FOLLOWING TRANSFUSION OF BLOOD

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THE fact that there are certain dangers attending any transference of blood from a normal to an ill person has been known for the last two centuries. Most of the reactions following such a procedure remained unexplained and their etiology seemed a mystery until the establishment of definite blood groups with a method of determining each by Jansky in 1907 and by Moss in 1910. As a result of these classifications, simple methods of grouping and of cross-agglutination have been demonstrated which have served to eliminate as blood donors many persons whose blood was shown in the laboratory to cause hemagglutination with the blood of the recipient, i.e., the two bloods were incompatible.

That there are perhaps other factors as yet little understood but which may nevertheless play a significant part in the causation of reactions following transfusion, was recently emphasized by Bordley¹ in a review of 17 cases. Since that time we have had the opportunity of studying on the Gynecological Service of the Boston City Hospital, 3 unusual cases in which a reaction occurred subsequent to the transfusion of blood. These 3 case reports are offered to supplement the literature now available dealing with these not infrequent phenomena, and to stress further their importance. It is regrettable that in only one of the two deaths was it possible to obtain permission for a postmortem examination.

CASE 1.—H. G., aged thirty-three years, married, white, was admitted on April 13, 1931. She had had a previous cholecystectomy and appendectomy and had undergone six full-term normal deliveries. She was about three and a half months pregnant but began to flow and pass clots two weeks ago and two days before admission she passed the fetus. Flowing began again the night before admission. Physical examination showed a well-nourished white woman in partial shock and showing profound evidence of loss of blood. Her blood pressure was 84/30, pulse 130, respirations 30, and temperature 98° F. The heart and lungs were essentially negative. Pelvic examination showed the uterus enlarged to approximately the size of a three and a half months' pregnancy, in anterior position and freely movable. The external os was wide open and placental tissue protruded.

A diagnosis of incomplete miscarriage was made and curettage followed by blood transfusion was ordered. Without anesthesia, under the usual aseptic technic the uterus was curetted of a large amount of necrotic, slightly foul smelling, placental tissue. The cervical canal was then iodinated and washed with alcohol, following which flowing had ceased.

The condition of the patient immediately following the operation was unchanged except that the pulse had risen to 150. Her husband was found to be a compatible

donor and so she was given 420 c.c. of whole blood on the operating table by the direct transfusion method of Seannell. The blood compatibility was ascertained by grouping the husband's cells with the patient's serum. Twenty minutes later she had a moderately severe reaction manifested by chills, slight cyanosis, dyspnea, lumbar backache, and nausea. The pulse remained 150 but the quality did not seem quite so good, though still strong. Her temperature remained unchanged at slightly subnormal. She was given morphia, gr. $\frac{1}{4}$, and adrenalin, m. 10, which quieted her in about fifteen minutes. At the end of an hour she was much improved and her pulse, still 150, was a great deal stronger.

On the day following the operation the patient had not voided, so she was catheterized and 12 ounces of urine were obtained. At forty-eight hours after the transfusion she still had not voided spontaneously, so she was again catheterized and 14 ounces of cloudy, amber-colored urine were obtained which showed a trace of albumin and many white blood cells. Later, seventeen hours after the last urine specimen and sixty-five hours after the transfusion, about 2 ounces of very dark, concentrated urine was obtained by catheterization. This showed a heavy trace of albumin and small amounts of sugar, and the sediment was loaded with pus cells. The patient was given large amounts of fluid by mouth and saline and glucose by hypodermoclysis. Hot water bottles and extra blankets were applied and the administration of hexamethylenamine and sodium acid phosphate three times daily was begun. On the fourth day she began to void spontaneously but passed only very small quantities of urine which were always highly concentrated, contained large amounts of albumin, and showed many pus cells in the sediment. She was drowsy, lethargic, and disoriented for time and place. On the morning of the eleventh day, the patient had a moderately severe convulsion which lasted about fifteen minutes. The nonprotein nitrogen content of the blood was found to be 92 mg. per 100 c.c. The blood pressure was 106/60 at this time and the urine still showed much albumin and many pus cells.

Following the convulsion the patient improved gradually and on the thirteenth day the blood picture was R.B.C. 3,250,000, hg. 50 per cent, W.B.C. 6,200. On the twentieth day the nonprotein nitrogen content of the blood was 58 mg. and the patient looked very much better, though still a trifle pale and anemic. Her kidney function as determined by the phthalein test was only 20 per cent for the first hour and 15 per cent for the second hour. She was discharged on the twenty-second day fully recovered from the effects of her miscarriage, and the uterus was well involuted. She was voiding abundantly and the urine showed only the slightest possible trace of albumin with a very few white blood cells in the sediment. Blood taken for a repeat cross-agglutination with the donor's blood showed incompatibility at this time.

CASE 2.—M. M., aged thirty-two years, single, white, was admitted to the Gynecological Service on May 18, 1931, but on account of an extreme secondary anemia due to vaginal bleeding, attempts were made to improve her blood picture before any surgical measures were attempted. A diagnosis was made of fibroid uterus, large cervical polyp, and severe secondary anemia.

On June 9, following a second transfusion of 500 c.c., using the citrate method, the patient began to bleed severely, losing practically as much blood as had been given by transfusion. On June 10, a moderate sized submucous myoma was removed, followed by a uterine pack to control bleeding. A third transfusion of 500 c.c. by the citrate method was done. The next day the patient's condition was slightly improved, her pulse ranging from 90 to 100. She was given large quantities of fluid by mouth and by hypodermoclysis and also a fourth transfusion of 500 c.c., this time of whole blood, by the Seannell method.

On June 12, a supravaginal hysterectomy was done under spinal anesthesia, using 165 mg. of novocaine in 3 c.c. of spinal fluid. Immediately following the operation, and while the patient was still on the operating table, she was given 500 c.c. of whole blood by the direct method, this being her fifth transfusion. There was no immediate reaction.

On the second day postoperative, there was no vomiting or distention, she was taking fluids well by mouth, and was being given glucose and saline by hypodermoclysis. The pulse was of excellent quality. Temperature 100.4°, pulse 124, respirations 24. By the fourth day there was practically a complete anuria. She was catheterized and only two ounces of urine were obtained which represented the total amount of urine secreted for thirty-six hours. Analysis showed a heavy trace of albumin and virtually nothing but pus cells in the sediment. The nonprotein nitrogen content of the blood was 200 mg. per 100 c.c. and the R.B.C. count was 4,100,000, with hemoglobin of 60 per cent. The legs were markedly edematous and the patient was almost comatose. The pupils were contracted, the tongue was furred, the breath was heavy, and there were fine twitchings of the muscles, a textbook picture of uremia. Temperature 100.4°, pulse 124, respirations 24. Intravenous saline and glucose were given but to no avail. In spite of every form of stimulant the patient grew gradually worse and died on the sixth day after operation.

The final diagnosis was fibroid uterus, secondary anemia, and uremia. Unfortunately, it was impossible to obtain permission for a postmortem examination. The blood of each transfusion donor had been grouped and cross-agglutinated by the Thorndike Blood Service, and all donors used were found to be compatible with the blood of the recipient and of the same blood group. Furthermore, two days after her last transfusion, a sample of blood was taken from the patient and again found to be compatible with each and every donor used, thereby practically precluding any hemagglutination as being responsible for the loss of kidney activity with ensuing uremia.

CASE 3.—J. A., aged twenty-two years, married, white. Her father died at the age of twenty-three years from acute nephritis and one sister, aged eighteen years, is a severe nephritic under treatment at the present time. The patient has had three full-term normal deliveries and had what she terms "urinary troubles" following the last pregnancy. She was about three months pregnant when she began to have profuse vaginal bleeding with the passage of clots one week prior to admission. Physical examinations showed a well-developed, rather obese, young female in shock, flowing freely. Her skin was cold and clammy, pulse 150 and at times imperceptible. The heart and lungs were negative. Pelvic examination showed the uterus enlarged to the size of a three or four months' pregnancy with the cervical os wide open and placental tissue protruding. There was a moderate hemorrhage from the uterine cavity.

The diagnosis of incomplete miscarriage was made and the following treatment decided upon. An immediate dilatation and curettage was done under very light anesthesia and a moderate amount of placental tissue was obtained. With massage of the fundus uteri bimanually and with administration of pituitrin intramuscularly the hemorrhage was readily controlled. The patient was in fair condition following the operation. She was now given 500 c.c. of citrated blood by the indirect method, one-half hour being the time consumed in infusing the blood. The blood cells of the donor were compatible in cross-agglutination with the blood serum of the recipient. This compatibility was later confirmed by another cross-agglutination test. Neither patient nor donor was typed, however. One-half hour after the transfusion she had a severe chill lasting fifteen minutes. The pulse became rapid and weak, requiring stimulation, following which she improved noticeably so that two hours later her condition was fairly good.

The first two days of convalescence were uneventful; the pulse remained about 100 and the temperature was normal. She voided a normal amount of urine, the analysis of which was negative except for a few white blood cells. Her color was still very pallid but there was no evidence of any jaundice. On the third day the patient began to vomit and complained of severe headache and pain in the right upper quadrant, and the liver edge could be palpated below the costal margin. Her blood pressure was 100/60. Mentally she was quite sluggish and very drowsy. There was no visual disturbance. On the fourth day she passed only two ounces of urine and then did not void again for forty-eight hours, following which she passed two ounces of very concentrated urine containing a large amount of albumin and many red blood cells but no casts.

For the next seven days the patient had what amounted to practically a complete urinary shut-down, passing about four ounces per twenty-four hours. During this time the pain and tenderness in the upper quadrant disappeared. She was very drowsy and in fact slept most of the time. She complained of "heaviness in her eyes" and of constant, severe headache. There was continual vomiting and not even water was retained. During this time there was no edema anywhere and this despite the fact that she was receiving from 4000 to 5000 c.c. of fluid in the form of saline subpectorally and glucose intravenously. Spinal anesthesia was administered on two occasions on the advice of the medical consultant who thought that the condition might be due to spasm of the renal vessels, but the results were very meager. The pulse and temperature remained normal. The small amounts of urine passed showed a large amount of albumin and many leucocytes; no red blood cells were obtained after the first specimen and there were likewise no casts. Edema of the face was noted on the eighth day; nonprotein nitrogen was 120 mg. per 100 c.c.

On the tenth day, seven days after the onset of anuria, she passed twenty ounces of urine, the first appreciable amount for a week. Curiously enough, simultaneous with this commencing to void, the patient developed a generalized edema. Constant vomiting and headaches continued while she remained very restless, responding to the slightest stimuli. Examination of the chest at this time showed beginning pulmonary edema. The urinary output continued to increase until very large amounts were passed, averaging 190 ounces per twenty-four hours. This urine was very pale, had a low specific gravity, showed a trace of albumin, and had a few white blood cells in the sediment. The nonprotein nitrogen came down to 114 mg. and the blood sugar was 111 mg. per 100 c.c.

On the thirteenth day the edema of the body and lungs had cleared up but the patient still retained her pasty appearance and still complained of severe headaches, vomiting frequently. On the sixteenth day, despite a large urinary output, her condition was much worse. The pulse was weak and irregular, there was marked muscular twitching of the hands and face, constant headache, and hypersensitivity to even the slightest noise. Mentally she was clear. Her blood pressure was 140/100 and the nonprotein nitrogen content of the blood was 95 mg. per 100 c.c. There was no edema and although the urine showed a slight trace of albumin there was no blood in the urine and no casts. She continued to grow worse and died eighteen days after the transfusion without ever having had any period of coma or any true convulsions. Permission for a postmortem examination was obtained.

Postmortem Examination.—The peritoneal cavity contained 2000 c.c. of clear amber-colored fluid and the wall of the stomach was edematous. There was moderate edema of the lower lobes of both lungs.

The liver edge was not visible below the costal margin. The liver was smooth, slightly enlarged, and soft. The surface was reddish brown and covered with a fine lacework of purple and brown petechial hemorrhages. On cut section the liver was

found to be moderately friable and tiny hemorrhages were present throughout the parenchyma. Normal markings were present.

The kidneys were both enlarged. The fatty and true capsules stripped with ease, leaving a gray, smooth surface covered with congested venules. On section the cortex varied in width from 5 to 7 mm. The cortex was gray and contained many petechial hemorrhages which tended to radiate to the surface. The markings of the medulla were accentuated and purple in color; they tended to radiate peripherally in fan-like pattern. The right pelvis and ureter were moderately dilated. The pelvic fat was normal. The adrenal cortices were filled with flame-shaped hemorrhages which radiated centrifugally.

Microscopic examination (by Dr. Frank B. Mallory) showed the alveoli at the bases of the lungs filled with coagulated serum and many monocytes. The venules in the alveolar walls were congested but there was no evidence of pneumonia. Cultures taken from the bases of both lungs showed *Staphylococcus aureus* and *Streptococcus hemolyticus*. The pathologists placed no particular significance on this latter observation. Culture of the heart blood was negative. The only lesions having any bearing on the case were found in the liver, adrenals, and kidneys. The liver showed focal areas of hemorrhagic necrosis with infiltration of polynuclear leucocytes and vacuolization of liver cells, quite similar to the degenerative processes found in the liver of eclampsia. The adrenals showed similar focal areas of hemorrhagic necrosis. (Dr. Parker of the Pathology Department has seen similar lesions in the liver and adrenals of anaphylactic animals.) In the kidneys the glomeruli were found to be normal. The tubules showed a marked hemoglobinuria with evidence of regeneration of tubular epithelium which had been severely damaged. There was no evidence of chronic nephritis.

The anatomic diagnosis was hemoglobinuric kidneys, petechial hemorrhages in liver and adrenals, ascites, and pulmonary edema.

SUMMARY

We have presented 3 cases of secondary anemia severe enough to require immediate transfusion. Two of the patients manifested a systemic reaction not later than half an hour after transfusion and all 3 patients showed a fairly similar delayed reaction. In no instance was there any reaction during the injection of the blood. The smallest amount of blood given was 420 c.c., and both the citrated and whole blood methods of transfusion were used.

The characteristics of the immediate reaction were a sense of discomfort, nausea, chill, dyspnea, and rapid pulse. These symptoms subsided in about twenty minutes. The delayed reactions began about forty-eight hours after transfusion and were characterized chiefly by urinary suppression, concentrated urine with a very heavy albuminuria, and hemoglobinuria. The bedside picture was that of slight jaundice, uremic manifestations with drowsiness, coma, muscular twitchings, and convulsions. The nonprotein nitrogen content of the blood was considerably elevated in each instance.

The blood compatibility was tested by cross-agglutinating the patient's serum with the donor's cells. In addition to the cross-agglutination the blood group was also established in Case 2. In Case 1, in which the patient recovered, a repeat cross-agglutination done at the time of the

patient's discharge from the hospital showed incompatibility by the same method which had showed no agglutination before the transfusion. Repeat cross-agglutination tests were confirmatory in showing compatibility in the other two patients, both of whom died.

The treatment was conservative in all 3 patients and consisted simply of forcing fluids by hypodermoclysis and by intravenous routes, together with general supportive therapy. In no instance did the condition of the patient seem to warrant operative interference for decapsulating the kidneys, such as was successfully performed by Bancroft.²

Permission for an autopsy was obtained in only one case, that of Case 3. Areas of hemorrhagic necrosis were found in the liver and adrenals. The kidney glomeruli were normal. There was marked hemoglobinuria in the tubules with evidence of regeneration of tubular epithelium which had been severely damaged.

The underlying cause of these severe reactions is not entirely clear. Two possible explanations are, (a) anaphylactic shock, (b) toxins liberated by transfused blood cause severe kidney damage.

Grouping both donor and recipient, and cross-agglutinating the donor's serum with the cells of the recipient, as well as vice versa, cannot be emphasized too strongly.

REFERENCES

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DIRECT INTRAABDOMINAL RADIATION IN ADVANCED PELVIC CARCINOMA*

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THIS is a preliminary report of a procedure designed to further the attack upon advanced pelvic carcinoma by applying roentgen rays directly to the affected tissues without the intervention of the abdominal parietes. The procedure is carried out in connection with the implantation of radium in the cervix or the uterine cavity as the case may require and has only been applied in instances where the entire pelvis is a mass of carcinomatous tissue with extension into the adjoining lymph nodes. The operation has been attempted upon three women without any postoperative complication or any particular discomfort to the patients. Details of the histories are attached.

*Read at meeting of the Obstetrical Society of Philadelphia January 5, 1933.

The technic of the procedure is as follows:

Under avertin anesthesia the patient is placed in the lithotomy position, biopsy is performed, the nature and extent of the carcinomatous infiltration is determined by bimanual examination and 50 mg. of radium are applied to the cervix or to the uterine cavity, with such filtration as is deemed appropriate for the individual case. The patient is then placed in the Trendelenburg position, the abdomen is prepared as usual for laparotomy, a median incision 6 to 8 inches in length is made, and the abdominal walls are widely separated by means of a Balfour retractor. The intestines are carefully walled off with a large gauze pad, after which the abdominal wall and all the pelvic tissues except those involved in the malignant growth are protected from irradiation by being covered with sheet lead, 2 mm. in thickness.

A roll of such sheet lead and large heavy scissors are in readiness, having been sterilized by boiling. Strips of lead are cut to fit the interior of the abdomen and are then snugly moulded into position (with the fingers) so as to isolate the tumor area absolutely, all other tissues being covered by strips of lead.

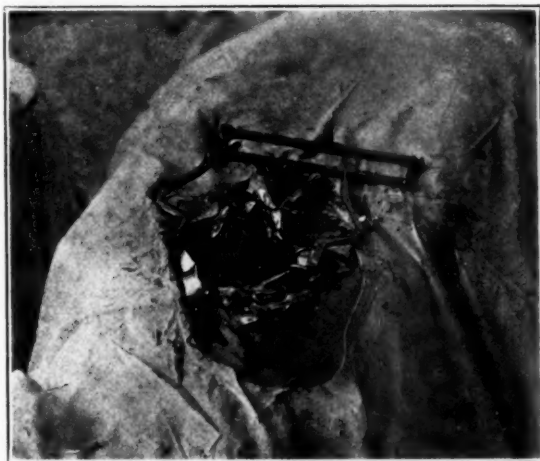


Fig. 1.—Field of operation ready for irradiation. Lead strips are clearly shown, protecting the viscera.

A large sterile dressing is then applied and the patient transported to the x-ray room where she is given a full therapeutic dose of x-ray; i.e., 150 ma. 18" distance, 130 K.V., 6 mm. aluminum filtration.

Upon the completion of the treatment the sterile dressing is replaced, the patient is wheeled back to the operating room, the lead and gauze packs are removed, and the incision is closed. No attempt whatever is made to remove any of the malignant tissues.

The operation is much facilitated when a light and simple operating table is used and avertin is the anesthesia of choice, because the patient lies quietly asleep during the entire procedure and time is not a particular factor.

This method of approach is suggested as being worthy of trial, and will be continued at Kensington Hospital until a definite series of cases may be assembled. Details of the three cases already treated follow.

CASE 1.—Miss C. R., aged forty-four years. Admitted July 2, 1932, and discharged July 31, 1932. There was history of septic abortion twenty years previously. Patient complained of vaginal discharge for past three years, being mucopurulent since March, 1932, and she had had vaginal bleeding with passage of foul-smelling clots since June, 1932. Pain in R.L.Q. for past three years. Constipation, anorexia, flatulence, and excessive weight loss in past three months.

Physical Condition.—B.P. 148/90; wasted and cachectic but ambulatory. Physical examination was negative, except for pelvis and abdomen. Hb., 55 per cent; R.B.C., 3,090,000; W.B.C., 12,400. The "frozen pelvis" was acutely tender; cervix showed cauliflower excrecences and bled on trauma. Mass rose in abdomen nearly to the umbilicus. Marked inguinal adenopathy. Advanced carcinoma of the cervix.

Treatment.—July 12: Laparotomy and x-ray irradiation; avertin anesthesia. One dose 175 ma. 20" distance, 6 mm. albumin filtration, 130 K.V.

July 29: Out of bed, much stronger, no bleeding but running temperature of 100° to 100.6° F.

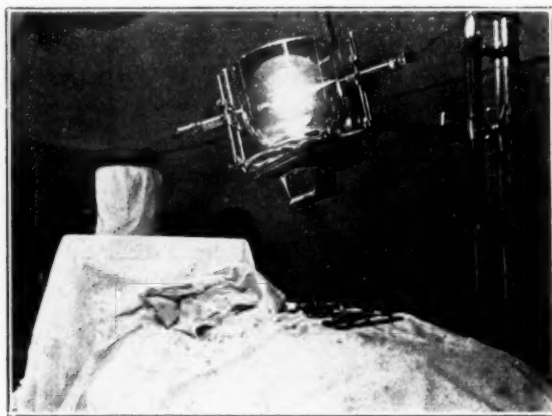


Fig. 2.—Application of the x-ray treatment. Patient in moderate Trendelenburg position under avertin anesthesia.

July 31: Discharged, but did not return for further treatment and was reported in moribund state in January, 1933.

Pathologic Diagnosis.—Advanced carcinoma of the cervix.

CASE 2.—Mrs. A. T., aged fifty-six years. Admitted July 2, 1932; discharged Aug. 16, 1932. History of "pelvic disease" twenty-eight years previously; one normal pregnancy in 1899. Patient complained of vaginal discharge and irregular bleeding for past five months, with bleeding daily for past month. Menopause two years before. Lower abdominal pain for past month. No weight loss.

Physical Examination.—Obese, white female not acutely ill, but appearing somewhat anemic. Outlet multiparous; cervix was large, hard, and smooth. Bleeding from cervical os. Uterus was large, fixed, and very hard. Adenocarcinoma of the fundus uteri.

Treatment.—Aug. 2, 1932: Dilatation and curettage, and insertion of 50 mg. of radium into the fundus under avertin anesthesia. One millimeter each of brass and rubber filtration; seventy-two hours' irradiation. Much foul necrotic tissue was removed. Laparotomy was performed, followed by x-ray irradiation. Postoperative course was uneventful. Patient was out of bed in twelve days and home on the fourteenth day. Subsequent deep x-ray irradiation.

Sept. 6, 1932: Dosage repeated five times, every other day.

Nov. 30, 1932: Two treatments anterior; two, posterior.

Pathologic Report.—(1) Adenocarcinoma of the fundus of the uterus, Grade III, and (2) secondary acute inflammation.

CASE 3.—Mrs. A. B., aged fifty-three years. Admitted Aug. 3, 1932; discharged Aug. 26, 1932. *Familial history* of carcinoma of liver, stomach (2 cases), and carcinoma of throat (2 cases). Six full-term normal deliveries and recoveries, and occurrence of menopause a "few years ago." Loss of thirty pounds' weight in past year.

Complaint.—Irregular bleeding beginning in July, 1931, which decreased in the winter following, but recurred more severely in May, 1932.

Physical Examination.—B.P., 120/60; Hb., 45 per cent, R.B.C., 2,970,000; W.B.C., 16,100. Patient, rather wasted, cachectic, highly nervous, appeared acutely ill. Outlet parous, bleeding visibly, cervix deeply invaded on right side by deep crater. Uterus was rigidly fixed and extremely tender. Advanced carcinoma of cervix, Grade IV.

Treatment.—Aug. 5: Laparotomy and x-ray irradiation through incision; avertin anesthesia. Uterus which was the size of a grapefruit, was thin-walled and ruptured during manipulation, liberating large quantity of foul pus. Large amount also escaped through the cervix. Closed without drawing.

Postoperative Course.—Uneventful. On Aug. 23, after being out of bed for two days, the cervix was dilated gently to promote better drainage of the pyometra. Patient was discharged Aug. 26 much improved. Bleeding had ceased. Patient has not returned to follow-up clinic, but her physician reports she has no pain or bleeding.

DISCUSSION

DR. J. DONALD ZULICK.—The administration of x-rays directly to the uterus through the opened abdomen is not a difficult problem from the x-ray standpoint. The point is: Are we justified in doing it? Radiologists, at least, all agree that radiation is the only means of treatment that offers any hope of palliation in these advanced cases. They do not agree, however, as to whether it is better to administer an intensive dose in one treatment, or fractional doses through multiple ports of entry, gradually bringing the dose up to saturation and maintaining it there for some time. Good results have been obtained by both methods.

One of the advantages of the method described by Dr. Schumann is that a full dose of x-rays is administered at once and then in about two weeks' time the saturation method can be carried out through skin which has not been previously exposed to x-rays. Unfortunately, it takes many years to establish the efficacy of any kind of cancer treatment and I feel that unless we can show results that are unquestionably better, we will not be justified in continuing this method which carries with it the added danger incident to the anesthetic and the opening of the abdomen.

AN UNUSUALLY LARGE OVARIAN CYST*

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ENORMOUS cysts are seldom seen today, modern surgery being responsible for their early removal. The present case is reported simply because the cyst was the largest I have ever seen.

Mrs. G. S., aged fifty-six years, was admitted to the Medical Service of the Long Island College Hospital on July 27, 1932, with the following history: She married at the age of twenty, had one boy thirty-one years ago, followed by three induced abortions from which she had normal convalescences. She had several minor sicknesses which are not relevant to the present condition. Two years previously at the age of fifty-four her menstruation ceased, and she thought she was at the menopause. She noticed, however, that her abdomen had been getting larger and consulted a physician who told her that she was eight months pregnant and that she had a breech presentation. He tried to do an external version but failed. When he thought she was at term, he took her to a private hospital and had her prepared for cesarean section. At the last minute she refused operation and left the hospital of her own accord. Her abdominal enlargement had steadily increased. For years she had had a mild indigestion but for the past two months she had increasing heartburn and acid eructations. Four weeks before admission the ingestion of any food other than fluids in very small amounts, was followed by vomiting. Dyspnea had been marked for the past two months; she had been unable to lie down, sleeping in the sitting position. For the past three months she had noticed that her arms and face were getting progressively thinner and that marked edema of the legs began about the same time.

Her condition on admission is best shown in Fig. 1, although she refused to expose her face, the expression of which was most striking. Her abdomen measured 31 inches from ensiform to pubis and 61 inches in circumference. The essential physical findings were as follows: Face, arms, and chest showed marked pallor with subicteroid tinge to the skin and marked emaciation. Examination of the heart, revealed the apex beat in the fourth space, 11 cm. from the midsternal line practically in the anterior axillary line. The heart sounds were good. Lungs showed shallow respiratory movements. There was dullness from the angles of both scapulae downward and in the axillae at the same level. The liver dullness began at the fourth rib. The abdomen was enormously distended; the wall was tense and edematous and there were many enormously dilated vessels front and back. A fluid wave was present and no areas of intestinal tympany could be elicited. The legs were enormously edematous. The temperature was 99° F., pulse 100, respiration 28, blood pressure 94/70, R.B.C. 3,500,000, W.B.C. 7,000, hg. 30 per cent, with marked achromia and microcytosis. Blood chemistry showed a moderate nitrogen retention; urine was negative; blood was negative by both the Wassermann and the Kahn tests, and the electrocardiograms showed moderate myocardial degeneration. Diagnosis of hepatic cirrhosis was made and a paracentesis through a small trocar was done on July 30. The fluid obtained was pseudomucinous and of a brownish color. The resident physician, realizing that something was wrong, sent to the Gynecological

*Presented to the New York Obstetrical Society, January 10, 1933.

Department for consultation. The fluid was running out very slowly and we advised that as much fluid be very slowly removed as the patient could stand. Nine gallons were removed during the course of twelve hours. She seemed very comfortable during this time, ate dinner and supper and had a good night following the withdrawal of the trocar. The next day the condition was very much improved and she was much more comfortable. This procedure seemed to have about half emptied the abdomen and, as she continued to improve, a second paracentesis was done on Aug. 7, when six gallons of fluid were removed. Then the tumor could be palpated and several irregular solid masses could be detected.

She began to show marked improvement and her appetite became enormous; she had been practically starved before. The daily improvement was remarkable. She



Fig. 1.

received five transfusions averaging 300 c.c. She improved so rapidly that on Aug. 29, she felt she could stand an operation, the hg. then being 65 per cent. This was done the next day under modified twilight sleep and light gas oxygen anesthesia. The cyst presented the typical appearance of a pseudomucinous cyst adenoma. The trocar was inserted and two gallons of fluid were withdrawn by suction, making a total of seventeen gallons. The collapsed wall was found to be adherent to the parietal perineum, intestine, omentum, and to the inferior surface of the liver. These adhesions were separated and tied without difficulty except that from the inferior surface of the liver there was a slight hemorrhage which was controlled by hot laparotomy pads. Because of the solid areas of the tumor and because the right ovary was also enlarged and cystic, as shown in Fig. 2, the possibility of malignant change was borne in mind. A small uterus and cystic right ovary were removed with the cyst which was of the left ovary.

The pathologic report is as follows: Uterus was markedly atrophic and measured after fixation 6 cm. in length, 4.5 cm. transversely at the level of the round ligaments, and 3 cm. in the anteroposterior axis. Symmetry was normal. The serous coat was smooth and grey. On incision the uterine cavity was dilated by a pedunculated submucous fibroid located on the posterior wall and measuring 1.5 cm. in

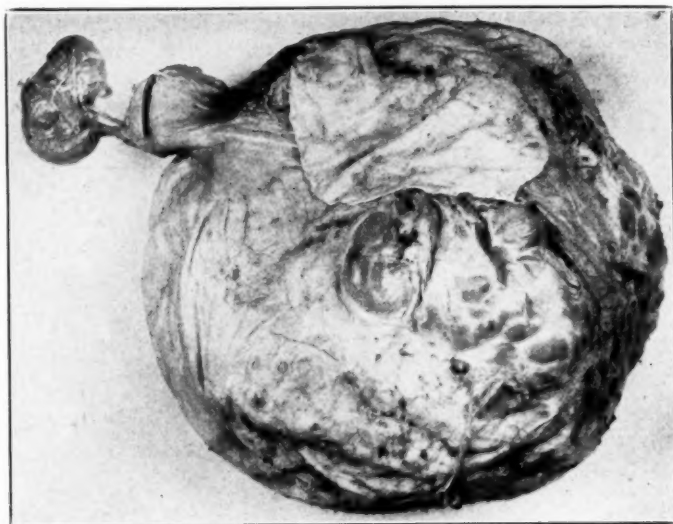


Fig. 2.

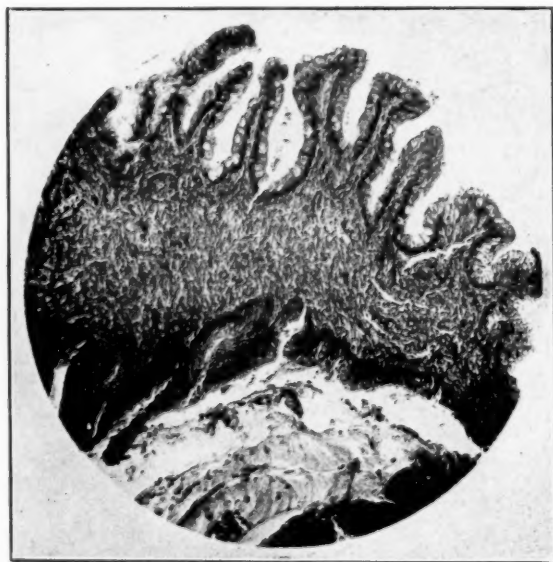


Fig. 3.

diameter. The overlying mucosa was soft and edematous. An endometrial polyp arising from the right lateral wall coursed transversely, measuring 15 by 8 by 3 cm. This encroached upon the internal os. The myometrium was atrophic and measured 18 mm. in thickness. Microscopically, the endometrium showed advanced atrophy.

The lining epithelial layer was only occasionally seen. The stroma was scant. The glands were few in number and small in size. The lining cells were of the low columnar type. The myometrium showed marked atrophy of its muscle fasciculi. Sinusoids were frequent and were of large size, indicative of pressure. The medium- and large-sized arteries showed mural and subintimal sclerosis. There was a slight increment in the connective tissue ratio. The muscle cells were small; cytoplasm was scant. The nuclei were pale and elongated. Focally, the intimal layer was swollen and fatty. This was the result of previous radiation. The veins showed thickening of the adventitia with fraying of the muscle in the intima and media. The serous coat was normal. No studies were made of the polyp or submucous fibroid. Diagnosis: Atrophy of uterus, senile and from radiation, endometrial polyp, submucous fibromyoma. The left tube had been converted into an Indian-club shaped hydrosalpinx which measured 8 cm. across the narrowest are. The right tube was markedly elongated, roughly 23 cm. in length, as the result of pressure by the huge ovarian cyst over the superior pole of which the elongated tube was stretched. The right ovary was converted into a huge round cyst which roughly measured 30 cm. in diameter. The superior aspect was slightly lobulated due to collections of daughter cysts within the central cavity. These varied in dimension from 5 to 25 mm. The tube and attenuated broad ligament coursed over its superior pole. The lateral aspect was similarly covered with adhesions. Fine punctate hemorrhages were irregularly distributed. Collections of daughter cysts were irregularly distributed, producing secondary semisolid tumors varying from 10 to 15 mm. in diameter. Microscopically, the lining epithelium was comprised of a solitary layer of tall mucous secreting goblet cells. Focally, ulceration had occurred. The granulation tissue was covered with mucin. At these sites the fibromuscular wall contained scattered neutrophils and collections of lymphocytes and plasma cells. The supporting wall was largely comprised of hyalinized connective tissue. Diagnosis: Pseudomucinous cyst adenoma.

The patient stood the operation well, received the usual routine postoperative treatment of saline hypodermoclysis and intravenous glucose. She made a very rapid recovery and was discharged on Sept. 19, twenty days postoperative.

COMMENT

One does not like, of course, to do a paracentesis on an ovarian cyst, but I am convinced that this woman's life was saved by that procedure. Her condition on admission was desperate and it seemed to us that in no other way could we hope for a favorable result, although the first paracentesis was done in a justifiably erroneous diagnosis.

TORSION OF THE NORMAL FALLOPIAN TUBE*

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TORSION of the uterine adnexa is not uncommon, many cases having been reported in the literature. Both ovary and tube are often involved in the torsion, and some definite pathologic lesion is usually present as the underlying cause. However, primary volvulus of a normal, undiseased fallopian tube alone is a rare occurrence and forms the basis of this report.

The attention of the profession was first drawn to torsion of the adnexa by Bland-Sutton¹ in 1891 at which time he described a case of a large hydrosalpinx which had undergone a torsion of three and a half turns. Since Bland-Sutton's case numerous reports have appeared in the literature, and mainly in cases where the cause was some lesion of the tube or ovary or both. In 1912 Anspach² collected and reviewed about 95 cases of adnexal torsion from the literature, the vast majority being attributable to a pyo- or hydrosalpinx. Only 13 of his cases were found in virgins, and even here the author believed that some preexisting infection, probably from childhood, such as a vulvovaginitis, may have existed.

Smith and Butler,³ 1921, reviewed the literature and found only 25 cases of torsion of ovarian tumors *before puberty*, only 14 cases of torsion of normal adnexa (tube and ovary or both) at any age, and only 5 cases involving the fallopian tube alone. Many reports have been made in the past five years where torsion occurred, but there was present some lesion either of the involved adnexa or that of the opposite side. Thorek,⁴ 1927, reported an interesting case in a girl of fourteen years with a typical symptomatology of acute appendicitis which diagnosis was made; on operation the right tube was found distended with blood and twisted 3 times to the left; the left ovary was enlarged and cystic, and is therefore not to be considered a case of torsion of undiseased adnexa. For similar reasons the cases reported by Douglas⁵ 1928, Wachtel⁶ 1928, and Nicholson⁷ 1929 are not included, in spite of the lesion being only insignificant.

Darner,¹⁴ 1926, reported 6 cases including one of his own where no pathologic lesion of tube or of adjoining adnexa was found that might have been the cause of the torsion. His own case is of interest because it has some features in common with the case to be reported here. His patient was a girl of thirteen years, who had a sudden onset of pain in the lower abdomen for five days before admission, nausea was present, but no vomiting, no rigidity, and no acute tenderness over McBurney's point. Rectal examination revealed a putty-like, tender mass in the right fornix; the urine was negative and the leucocyte count 14,800. The diagnosis was acute appendicitis with abscess. A laparotomy was performed and blood-tinged fluid was found in the peritoneal cavity, the appendix was normal, but the distal $\frac{1}{3}$ of the right tube was distended and bluish black, the medial and proximal $\frac{1}{3}$ twisted clockwise three and a half times. A right salpingectomy was done and the patient made an uneventful recovery.

Gabe,⁸ 1929, stresses the point that distinction should be made between torsion of a "normal virginal tube" and that of married women, i.e., one in which no

*Read at a meeting of the Obstetrical Society of Philadelphia, December 1, 1932.

finding of infection is present on examination of the tube, and in which there is no history of pelvic infection. His case is that of a girl thirteen years of age, menarche at eleven and regular, who had acute onset of pain in the right lower quadrant, nausea, and vomiting with tenderness over McBurney's point. Urinalysis was negative, the leucocyte count 18,000 and 78 per cent polymorphonuclears. The case was diagnosed acute appendicitis. On operation free blood-stained fluid was present, the appendix was not diseased, the right tube was twisted 4 cm. from the uterine junction and two and a half turns, the strangulated, bluish mass was removed with the tube. Both ovaries and the other tube were normal. The patient was discharged in good condition.

Ahumada and Prestini⁹ 1929 believe that torsion of the "normal" tube is favored by hypoplasia of the tube with relaxation of its supporting ligaments. They report one case where the history and subsequent findings revealed no cause for the torsion.

Koster,¹⁰ 1929, reports one case in a girl of sixteen years which can be included in the grouping of cases of torsion of an undiseased fallopian tube. Michon¹¹ reports 3 cases of tubal twists alone where he found no lesion present to explain the torsion; he gives several explanations of his own which are mentioned at another point in this report.

Mange,¹² 1931, reports a single case in a woman aged forty-one. Downer and Brines,¹³ 1931, in order to eliminate any possibility of an inflammatory lesion, limited their cases to girls under sixteen years and unmarried, and they found only 6 cases in the literature where a normal tube alone had undergone torsion. Their own case was in a patient aged seven years, and involved the left tube which was twisted 5 times. Shute,¹⁵ 1932, has reviewed the literature on torsion of the adnexa, and includes in his article torsion under practically every condition. He does not discriminate very clearly between torsion of a normal tube alone and torsion of both tube and ovary. Most of the case reports mentioned by Shute have some definite pathologic factor as a basis; his own cases, 6 in number, all reveal some pathology of either the tube or the ovary. Torsion of the adnexa, particularly of pathologic adnexa, is, as Shute writes, not at all uncommon; however, the case to be reported here is limited to torsion of a normal fallopian tube alone without involvement of the ovary on the same side or of the opposite adnexa, and is extremely rare. Using Downer and Brines' method of limiting the cases, the case to be reported by the present writers becomes the seventh.

CASE REPORT

H. L. S., a well-developed white girl, thirteen years of age, with a history of having been perfectly well until about four hours before admission when she was awakened from her sleep by an acute, sharp pain in the lower right quadrant, no urinary symptoms, but nausea and vomiting occurred in about an hour after onset of pain. No dietary indiscretion was present. There were no chills and no fever; pain increased in severity until time of operation. The patient had not begun to menstruate. The past history was negative; there was no vaginal discharge. There was rigidity of both recti muscles, especially the right, an extreme tenderness over McBurney's point. The urinalysis was negative; the leucocyte count 15,000 with 82 per cent polymorphonuclears. Rectal examination was negative. A diagnosis of acute appendicitis was made. The patient was operated upon under nitrous oxide-oxygen anesthesia through a McBurney incision and when the peritoneal cavity was opened a small amount of bright free blood was found. The appendix appeared fairly normal, but was removed. The right adnexal region was explored after enlarging the incision, and the right fallopian tube was found twisted on itself in a

counter-clockwise direction two and a half turns at a distance of about $1\frac{1}{2}$ inches from the uterine attachment at the outer end of the ovary. The end of the tube was dark red, gangrenous and about the size of a hen's egg, and full of blood. The tube was untwisted, ligated at the point of torsion and resected. The right ovary was pale and infantile in character and not involved in the torsion. The uterus, left tube and ovary were normal. The patient made an uneventful recovery and was discharged from the hospital on the ninth day.

Section of tissue showed almost total destruction of the lining mucosa of fallopian tube. Edema and hemorrhagic congestion of tubal wall. Blood vessels engorged. Large areas of blood clots were seen. The picture was that of cellular destruction due to strangulation rather than an inflammatory process.

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MEDICAL ARTS BUILDING
NORFOLK APARTMENT

ABRUPTIO PLACENTAE (COMPLETE) WITH SPONTANEOUS PARTIAL RUPTURE OF THE UTERUS*

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(From the Obstetrical Service of the Brooklyn Women's Hospital)

THE case to be reported is one of abruptio placentae with concealed hemorrhage occurring in the last quarter of pregnancy with spontaneous partial rupture of the uterus, in a cardionephritic patient, and complicated postoperatively by bronchopneumonia, with recovery.

Mrs. G. L., thirty years of age, white, Hebrew, para ii, gravida v, was admitted to the Brooklyn Women's Hospital on February 11, 1932. Past history was irrelevant. No history of diphtheria or scarlet fever. Her family history was essentially negative. Catamenia began at the age of thirteen, is of the twenty-eight-day type, and lasts for two days, with no dysmenorrhea. She married at the age of twenty-three and has had 2 miscarriages, each of which was spontaneous and each at the end of three months, with no sequelae. She has had two full-term pregnancies with normal deliveries and puerperia. The first child died at the age of eleven weeks, presumably of pneumonia. The second is living and is about three years of age.

Her last menstrual period was on June 15; labor was calculated as of March 22, 1932.

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Unfortunately, she came to the antepartum clinic only once, and that was just two days prior to admission, at which time the blood pressure was 115/70, weight 137½ pounds; there was edema of the ankles; fetus in L.O.A. position, cephalic presentation; fetal heart heard in left lower quadrant; urine 4-plus albumin, with moderate hyaline casts, otherwise negative.

Labor began at home at 2 A.M. on February 11. Patient was admitted to the hospital at 7:45 A.M., on the same day, having moderate, regular, rhythmic contractions occurring every ten minutes. Examination showed a poorly developed and undernourished woman about thirty years of age, of low mentality. Her face was pock-marked and sallow. Apex beat in the midclavicular line, with heart sounds of only fair quality. The lungs were negative. The uterus corresponded in size to that of an eighth month gravidity, with the fetus in L.O.A. position, cephalic presentation. Fetal heart sounds in the left lower quadrant, fair quality and normal rate. Rectal examination showed cervix one finger dilated, membranes intact, head unengaged. Blood pressure 130/90, temperature 99, pulse 88, respiration 20. Urine analysis: acid reaction, three-plus albumin, occasional red blood cell and many white blood cells. Wassermann and Rosenthal tests were negative.

Repeated rectal examinations during the subsequent sixteen hours after admission found her cervix dilated three fingers with strong rhythmic, intermittent contractions. Head continued unengaged, membranes were not ruptured, fetal heart ceased to be heard. Morphine sulphate, gr. ¼, magnesium sulphate, 2 c.c. of a 50 per cent solution, were administered. Fluids were forced, with plenty of fruit juices. Blood pressure readings during this time ranged from 130/90 to 120/100. Temperature 99° F., pulse 80 to 90.

At 7:45 A.M., twenty-four hours after admission, the resident physician reported as follows: rectal examination showed cervix almost fully dilated. Blood pressure 120/90. Head still unengaged. Patient having strong contractions. Fetal heart questionable.

At 10:45 A.M., the patient complained to the nurse in charge, of a sudden excruciating pain in the abdomen, which radiated to the sides of the abdomen, and she was gasping for breath. Being in the hospital at the time, I was immediately summoned to the labor room and found the patient in shock: skin cold and clammy with a profuse perspiration on the forehead, dilated alae nasi, and pallor of the lips and mucous membranes. Respirations were labored. Pulse was weak, thready, and rapid. The heart sounds were of poor quality, rapid with marked accentuation of the second pulmonic sound and a faint aortic sound. Râles were present in both lungs posteriorly at the bases. She had severe continuous pains in the abdomen and in both flanks. There was no epigastric distress and no upper abdominal rigidity, though the abdomen was tense, distended, and tender to touch. The uterus presented a boardlike rigidity, giving one the impression of being tetanically contracted. The fetal heart was not heard.

Vaginal examination showed cervix one finger dilated, tender, and rigid. Head ballotable and still unengaged. No evidences of any external bleeding. Temperature 100° F., pulse 140, respiration 34, blood pressure 140/100. A diagnosis was made of an abruptio placentae with concealed hemorrhage and possibly an impending rupture of the uterus. Treatment for shock was immediately instituted. Catheterized specimen of urine at this time continued to show three-plus albumin, and red and white blood cells. Blood count: R.B.C. 2,780,000, hg. 56 per cent, W.B.C. 16,900, polymorphonuclears 80 per cent, leucocytes 20 per cent.

At 1 P.M., three hours later, the hg. had receded to 40 per cent; blood pressure was 90/30, pulse 120, of fair quality. Fetal heart not heard. Abdomen still very tense and uterus ligneous. She had, however, rallied sufficiently from her initial shock to consider operative interference.

I performed a classical cesarean section under local anesthesia (novocaine $\frac{1}{2}$ per cent). Free blood was found in the abdominal cavity. The uterus was firmly contracted, though no thinning of the muscle at any one region was detected. A rent was seen on the anterior fundal surface, extending through the serosa and its subjacent muscular tissue.

The laceration was about 6 cm. long and 1 cm. wide. The uterus appeared purplish with definite areas of extravasation of blood under the serosa. The tubes and ovaries were grossly apparently normal. A longitudinal incision was made through the lower half of the uterus and a macerated fetus removed. There was a large clot between the placenta which lay directly behind the laceration and was completely detached. The uterus, right tube, and ovary were removed by the clamp and ligature method. Intravenous glucose and saline were given during the operation. This was followed by 450 c.c. of whole blood Type II (Moss).

Pathologic Report (Dr. Goldzieher).—Previously globus uterus, partly contracted with somewhat boggy consistency, resembled well-advanced gravid uterus. There was slight intraligamentous hemorrhage in the right adnexa. On the anterior fundal surface a 7 cm. long and 1 cm. wide laceration of the serosa and subjacent uterine musculature for a distance of 6 to 8 mm. was noted.

Uterine wall reached average thickness of 3 cm. and showed no evidence of thinning out. On posterior aspect the myometrium was stained an odd brownish color along a thin layer beneath the serosal coat which may be the site of extravasated blood.

Microscopic examination showed ordinary myometrium with no pathologic changes.

On the third day the patient's R.B.C. count rose to 3,200,000 from the previous count of 1,800,000 and the hg. to 61 per cent from 36 per cent. On the fourth day postoperative, the patient experienced a severe chill, complained of pain in the chest, dyspnea, and cough. Temperature rose to 105° F. Examination of the chest revealed the presence of bronchopneumonia. Her subsequent postoperative course was that of recession of temperature by lysis. Sutures were removed on the eighth day with wound healing by primary union. The patient was discharged on February 27, sixteen days after admission.

In her follow-up at the clinic, her urine still showed a three-plus albumin, with moderate amount of hyaline casts, and many red and white blood cells. Blood count 3,500,000, hg. 73 per cent, blood pressure 120/90.

A vaginal smear taken at her last appearance at the clinic, showed *Trichomonas vaginalis*.

536 SARATOGA AVENUE.

REPORT OF THREE CASES OF RUPTURE OF THE UTERUS FOLLOWING PREVIOUS CESAREAN SECTION*

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(From the Obstetrical Service of Brooklyn Hospital)

AT THE Brooklyn Hospital during the last ten years, 160 cesarean sections have been done, 51 patients having been previously sectioned, among which were 3 cases of ruptured uterus in subsequent pregnancies.

The first patient was thirty-seven years old, para ii. Her previous history included a classical section done at the Brooklyn Hospital in 1919, for a pregnancy complicated by a placenta previa. Her postpartum course was febrile for sixteen days and for at least two weeks she had abdominal pains and a foul lochia. While there was no infection of the abdominal wound, the postpartum course indicated that there was infection, probably involving the uterine wound. She was discharged on the thirtieth day postpartum. The second pregnancy terminated in a spontaneous breech delivery in 1925, with no postpartum complications. The present history began at the patient's home on April 15, 1927, with a sudden attack of sharp pain in the abdomen which persisted, and she fainted several times. There were no labor pains or bleeding, and the expected date of labor was not until April 20. She then presented the picture of considerable shock, with pallor, pale lips, and cold extremities. The pulse was very weak and rapid, the rate 132, and the blood pressure was unobtainable. She was sent to the hospital and an immediate operation was performed. The placenta was found protruding through the center of the former wound in the uterus. There was considerable blood in the peritoneal cavity. After rupturing the membranes, a dead fetus, weighing eight pounds and nine ounces, was extracted. The edges of the uterine wound were freshened and sutured with interrupted catgut. A blood transfusion of 1000 c.c. of blood was given before and during the operation. An afebrile convalescence ensued and the patient was discharged on the twenty-second day.

The second patient was thirty-eight years old, para ii, admitted to the Brooklyn Hospital May 1, 1928, in good health and not in labor. The expected date of confinement was five days later.

Previous History: She was first delivered in 1924 at the Long Island College Hospital by craniotomy, at which time she had an intra- and postpartum fever. She was delivered there a second time in 1926 by an elective cesarean section, classified by the operator as a "low classical" for toxemia; she had a slight febrile convalescence. After her admission to the Brooklyn Hospital, an elective cesarean section was scheduled for May 5 at 8 A.M. However, at four o'clock that morning, the patient was awakened with a severe abdominal pain, and symptoms of shock rapidly developed. An immediate operation was performed. The abdominal cavity was filled with blood and the uterus showed a rupture 1" long by $\frac{3}{4}$ " wide at the top of the former uterine incision. Underneath this was the placenta. The incision was extended upward and a dead fetus, weighing eight and a quarter pounds, was extracted. The edges of the rupture were closed with interrupted chromic gut sutures after first freshening them by removing a bridge of uterine tissue. Histologic

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examination of the latter showed a marked hypertrophy in the size of the muscle cells and distention of the vascular channels. A 700 c.c. blood transfusion was given before and during the operation. Except for fever lasting only the first forty-eight hours, a good postoperative convalescence ensued and she was discharged sixteen days later.

The third patient was a twenty-six-year-old para i who was admitted on Sept. 9, 1932, to the Brooklyn Hospital, labor having begun four hours previously at home. Her expected date of confinement was Sept. 20. In 1927, a classical cesarean section had been performed at the Plaza Hospital in Manhattan, after a three-day labor, and a living child was obtained. An infection of the abdominal wound necessitated a month's stay in the hospital. When I first saw the patient, the pains present on admission had entirely subsided; she did not appear to be ill and had a normal pulse rate and a blood pressure of 116/70. The abdominal examination showed a full-term pregnancy; the previous cesarean scar was irregular and above the umbilicus; there was a soft bulging protrusion which resembled an umbilical hernia about eight centimeters in diameter, which fluctuated and had a flat note on percussion. Surrounding this protrusion, the separated tender edges of the old uterine wound were felt. A diagnosis of ruptured uterus with membranes bulging through the old wound was made, and an immediate operation was performed. In the uterus, there was a rupture 8 cm. long, the entire length of the previous incision. Through this opening ballooned the intact amnion. There was neither free blood in the abdominal cavity nor bleeding from the edges of the rupture. The sac was ruptured and a living full-term baby, weighing eight pounds, two and a half ounces, was extracted. The placenta was attached to the posterior wall. The edges of the wound were freshened and sutured with interrupted chromic catgut. An infusion of 600 c.c. of saline solution was given; blood transfusion was not necessary. A good convalescence without fever ensued, the patient being discharged on the nineteenth day.

30 PIERREPONT STREET.

RUPTURE OF UTERINE SCAR AND URINARY BLADDER FOLLOWING CESAREAN SECTION

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MRS. B. C., adult, white, twenty-nine years old, was admitted to the Beth David Hospital on April 7, 1932, with the following history: Patient had a classical cesarean section performed on June 9, 1926 for eclampsia and a living baby of three pounds was delivered. Postoperative course was uneventful.

Last menstrual period July, 1931, expected date of confinement latter part of April, 1932. On April 7, 1932 about 3:00 A.M. patient experienced mild pains in lower abdomen. Fetal movements were felt. At 6:00 A.M. the pains became very severe, frequent, tearing in character, and located in the right lower quadrant. Pains continued so for three hours. Patient was seen for the first time by me at 8:00 A.M. Physical examination revealed a patient acutely ill, restless, with slight pallor, and complaining of severe abdominal cramps. Temperature was normal and pulse rate 96. Abdominal examination revealed an irregular hard mass in the right iliac fossa, tender to touch. There was an ill-defined soft globular mass extending to within three fingers of the ensiform process. No uterine bruit or fetal heart was heard. There was slight vaginal bleeding, estimated amount about 2 ounces. Rectal examination revealed no presenting part. The pelvis was entirely free. At this

time a diagnosis of an impending uterine rupture was made and the patient brought to the hospital at once. After the patient reached the hospital (at 10:00 A.M.) she presented an entirely different clinical appearance. She appeared very comfortable, pulse was slow and of good volume. There were no pains and no bleeding. The patient's condition remained unchanged until 6:00 P.M. when she complained of slight pressure in the rectum, and sharp pains in the lower abdomen. Patient was catheterized twice before the operation and in each case a few drops of bloody fluid were obtained.

A preoperative diagnosis was made of rupture of the uterus and bladder.

Operation.—A right paramedian incision was made. About 350 c.c. of free blood was found in the peritoneal cavity and the uterus was well contracted lying in the left iliac fossa. Peritoneum of the lower one-half of the anterior abdominal wall (site of old operation) was hemorrhagic. Fetus within intact gestation sac was found free in the general peritoneal cavity. Amniotic sac was punctured, and the fetus was delivered by breech. Membranes and placenta (which lay under the liver) were removed manually. Tenaculum forceps was placed on the fundus of the uterus and the uterus was delivered into the wound. There was a large rent found about 6 by 15 cm. extending from the intertubal line, vertically downward in the midline on the anterior surface of the uterus, including the cervix; marked contusion and subperitoneal hemorrhage of the torn vesicouterine fold. On exposure of the vesicouterine fold of the peritoneum the entire fundus of the bladder was found torn off, presenting an opening about 7 cm. in diameter. A supravaginal hysterectomy was done in the usual manner, the cervix repaired with interrupted chromic sutures. The lacerated bladder was closed with fine chromic sutures, inverting mucosa, followed by two additional rows of sutures, the last row for peritonealization. The cervical stump was completely peritonealized and round ligaments and tubes were brought into stump: 5 Penrose drains were placed in anterior pelvic cavity. Abdomen was closed in layers. Indwelling catheter was placed in bladder and about 2 ounces of bloody urine was obtained; 750 c.c. of saline by hyperdermoclysis was given on the table. Patient left the operating room in fair condition.

Postoperative convalescence was unusually smooth. On the twelfth postoperative day a small amount of urine leaked through the lower angle of the wound. This fistula closed in about one week. Patient was discharged on the twenty-fourth day. She was perfectly well when seen several weeks later for follow-up examination and had no bladder symptoms of any kind.

In reviewing the clinical course of this case, the mechanism of rupture of the scar and expulsion of the fetus, may be explained as follows: The mild pains at the onset were caused by stretching and beginning rupture of the scar. The severe abdominal pains which lasted for three hours were simply uterine contractions (labor pains) which forced the fetus in its intact sac through the rent in the uterus. During the delivery of the fetus because of adhesions present, the bladder was lacerated. The cessation of abdominal pains (labor pains) and the fairly comfortable appearance of the patient may be compared to the appearance of any postparturient after the fetus has been expelled and the uterus has ceased to contract.

TERATOCORMUS, CYLLOSOMA*

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FETAL anomalies and monstrosities crop up every now and then in any large series of obstetric cases. Because of the very unusual clinical features and apparently quite rare anatomic findings, the following fetal abnormality was deemed worthy of report.

CASE 77811.—A white primipara, aged eighteen, menstruated last Feb. 28, 1932. She later visited the prenatal clinic of the University Free Dispensary where her physical examination was reported negative except for a moderate thyroid enlargement. The pelvic measurements were found to be ample and the Wassermann reaction was negative in all antigens. Fetal heart tones were heard and fetal movements observed by the examining physician. About 4 A.M., Sept. 30, 1932, patient awoke to find a moderate amount of watery discharge on her nightclothes and then felt something coming down into vagina. There were no abdominal pains at this time. She was admitted on the Obstetrical Service of the Hillman Hospital at 8:30 A.M. at which time there was visible a complete prolapse of several inches of



Fig. 1.—Drawing of the monstrosity showing the extensive visceral prolapse.

fetal gastrointestinal tract. A small nubbin of appendix could be identified and the prolapsed coils had the discoloration of a strangulated hernia. The cervix was scant two fingers dilated, canal not obliterated, and neither fetal heart tones nor fetal movements could be detected. Uterine contractions began soon after hospital admission. A diagnosis of either a fetal monstrosity or an enormous congenital hernia was made and the patient allowed to go into labor. Intrauterine death of the fetus appeared obvious. Contractions continued at intervals throughout the day with a gradual increase in the amount of prolapsed tissues. These were wrapped in a gauze bag, frequently saturated with antiseptic solution, and held away from the perineum by means of adhesive strips. Spontaneous breech delivery of the stillborn monster occurred at 11 P.M. Placental expulsion at once followed delivery of the fetus and at no time was there any appreciable escape of amniotic fluid. The mother's postpartum course was afebrile and uneventful.

*Presented before Jefferson County Medical Society, Birmingham, Ala., October 24, 1932.

Gross Description.—The fetal head measured 31.5 cm. in greatest circumference and both upper extremities appeared well developed. The right lower extremity was lying at an angle of 45 degrees with the trunk and the lower leg strongly flexed. The left lower extremity and most of the anterior abdominal wall were absent. The line of failure extended upward from the genital area to the costal margin, thence transversely down around the body to the tip of the coccyx. There was a string of attachment between the margins of the body wall. On the ventral side this was continuous with the membranes of a placenta. The abdominal contents depended from the upper and posterior wall of the remaining body cavity. On the left side the finger could be passed upward into the thoracic cavity. The liver was lying across the upper ventral portion of the visceral mass. The spleen was recognizable on the left side and near it was a small stomach. A kidney was present over the sacral region. The intestines formed a tangled mass depending below the other viscera.

Comment.—Search of the obstetric literature and texts, modern and old, revealed that the term "cyllosoma" fitted this monster. The term, derived from two Greek words, literally means "hollow body." Such a monster would belong to the teratocormus or trunk abnormality group. Apparently a large portion of the entire fetal gastrointestinal tract was lying free in the amniotic sac and prolapsed following a premature rupture of the amnion. From the appearance of the fetal tissues, intrauterine death must have occurred about the time of the prolapse. No definite developmental explanation for the monstrosity is offered. We believe that a relative oligohydramnios was probably present in the case but its importance as the primary factor is somewhat doubtful.

Hilpert, F.: Stenosis of the Large Intestines as the Result of Disease of the Female Genitalia. *Monatschr. f. Geburtsh. u. Gynäk.* 91: 279, 1932.

Pelvic infections which are associated with large exudates have a decided influence upon the rectum and sigmoid. By means of x-ray pictures it is possible to detect the origin of the results of inflammatory changes. Likewise it is possible to tell the difference between tumors of the bowel and inflammatory tumors of the adnexa outside of the bowel. Tumors of the bowel show a narrowing of the lumen on x-ray plates, whereas inflammatory lesions produce a stretching and elongation of the involved portion of the intestines. The absence of any defect in the wall of the bowel also speaks against a malignant tumor of the intestines. Likewise in cases of stenosis due to a bowel tumor, barium is blocked whereas in cases of obstruction due to overlying inflammatory tumors, the barium passes through the bowel. The intestinal mucosa remains unchanged.

J. P. GREENHILL.

Guthmann, and May.: The Question of Intrauterine Renal Function. *Monatschr. f. Geburtsh. u. Gynäk.* 91: 306, 1932.

The urea and uric acid in the maternal blood and in the liquor amnii were studied by Guthmann and May. They found that these products increased in the liquor amnii with advance in pregnancy. On the other hand, these substances remained constant within physiologic limits throughout gestation in the mother's blood. Hence the kidneys of the fetus function and secrete urine at least during the second half of pregnancy.

J. P. GREENHILL.

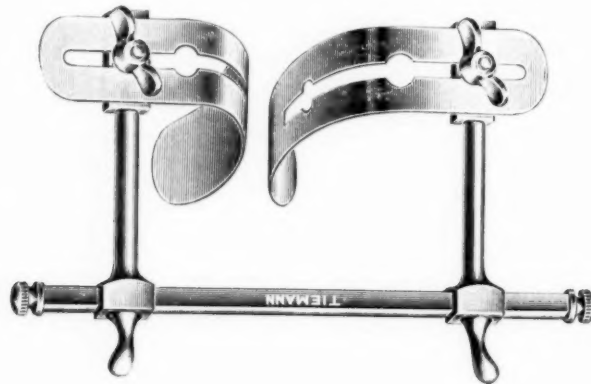
A VAGINAL RETRACTOR FOR OPERATIONS ON THE CERVIX

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THIS vaginal retractor was devised to obtain a better exposure of the cervix for operative treatment. The chief difficulties encountered by the surgeon in the operating room are faulty exposure, the necessity of two assistants to hold retractors, and undue tension exerted on the vulsellum, applied to the cervix. The latter is often attended by an undue stretching of the uterosacral ligaments, and, in some instances, it may even cause a prolapse of the uterus.

In the performance of the common operations on the cervix, exposure of the latter is usually obtained by the insertion of a weighted vaginal speculum into the



vagina. Right-angled retractors, held by assistants, are placed to roll out the lateral vaginal walls. Under these circumstances the operating field is usually small, and consequently it becomes necessary, in most cases, to pull the cervix by tenaculum down to the vulvar opening where it can be operated upon with greater facility.

Our instrument is a self-retaining retractor, consisting of two pliable blades which are attached to the arms by set screws. The blades can be shaped or bent to conform with the individual and anatomical configuration of the lateral vaginal walls, and they can also be lengthened or shortened as desired by fixing the set screws. The lateral vaginal walls and edges are thus held apart without assistance, giving an excellent view of the cervix and a more roomy operating field in which to work. This instrument can be employed with or without the weighted vaginal speculum.

The illustration shows the complete instrument, assembled with the pliable retractor blades in position.

We wish to acknowledge the help of Mr. F. W. Schaefer of George Tiemann and Company who made the retractor and offered many valuable suggestions.

180 EAST ONE HUNDRED ELEVENTH STREET.

Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D., CHICAGO, ILL.

A STUDY OF MATERNAL MORTALITY IN 15 STATES

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OBVIOUSLY studies of maternal mortality based on death certificates are insufficiently detailed and studies based on selected series of cases insufficiently general to give a picture of conditions surrounding the deaths from puerperal causes in the United States as a whole. Accordingly a plan for a study of maternal mortality by means of interviews with physicians attending all the deaths from puerperal causes in a State in a set period of time was presented by the Chairman of the Children's Bureau Obstetric Advisory Committee¹ to the 1926 Conference of State Directors in charge of the administration of the Maternity and Infancy Act. Such a study was made of all the deaths in 1927 and 1928 in 13 States—Alabama, Kentucky, Maryland, Michigan, Minnesota, Nebraska, New Hampshire, North Dakota, Oregon, Rhode Island, Washington, Wisconsin, and Virginia—and of the deaths in 1928 in 2 others, California and Oklahoma. The study was made in these States at the formal request of the State Medical Societies; the interviews were made by physicians on staffs of the State Boards of Health or of the United States Children's Bureau, and all statistical work was done in the Children's Bureau. Close contact between all interviewers was maintained to keep interpretation uniform. The writing of the report has been done under the guidance of the members of the Obstetric Advisory Committee and they have supplied the comments and recommendations for the report.²

The population of the States included conformed fairly closely to the population of the United States according to the Census of 1920. The maternal mortality rate was 64 per 10,000 live births in the States included as compared with 67 in the Birth Registration area for the two years.

In these States and years 7,537 deaths were assigned by the Division of Vital Statistics of the Bureau of the Census to the group "the puerperal state" in accordance with the *International List of Causes of Death*, 1920 revision and the *Manual of Joint Causes of Death*. These deaths were taken as the basis of the study. A copy of each death certificate, and when possible the birth certificate of the infant, was obtained from the State bureaus of vital statistics each month and the attending physician or midwife was visited as soon as possible thereafter. In hospital cases the hospital also was visited. The physicians interviewed were most cooperative in giving time and information for the study. While relatively few had kept case histories, their memory of the case was usually vivid. But in many

¹Robert L. De Normandie, Chairman; Fred L. Adair, Rudolph W. Holmes, Frank W. Lynch, James R. McCord, C. Jeff Miller, Otto H. Schwartz, Alice N. Pickett.

²The study is reported in:

Maternal Deaths: a brief report of a study made in 15 States, U. S. Children's Bureau Publication No. 221. Washington, 1933.

Maternal Mortality in 15 States. (In press.) This is the detailed report of the findings, with base tables and with fuller discussion.

cases either the opportunity or the facilities for a thorough study of the case had been lacking. In relatively few cases had any laboratory work other than urinalysis or blood pressure examination been done. Only 571 autopsies had been performed, and many of these were in coroner's cases or in other cases of doubtful diagnosis in which the autopsy had been performed for legal rather than for scientific reasons. In a few cases, particularly when no physician had been in attendance, very little information except that given on the birth and death certificates could be obtained.

A number of changes in classification were found necessary as a result of the interviews. Of the 7,537 deaths studied, 157 were found to be nonpuerperal in the meaning of the international classification, and were accordingly excluded. Sixty-eight of these women had not been recently pregnant; the other deaths would have been assigned to such causes as chronic nephritis or cardiac disease, tuberculosis, or others taking precedence over the puerperal cause, if full information had been given on the death certificate. The analysis was based on the 7,380 deaths found after interview to be puerperal in the meaning of the international classification. However, as deaths actually puerperal but assigned to some other cause on account of defective certification, were not among the 7,537 studied, the total of 7,380 deaths and the mortality rates given in the report as based on that number, are probably too low. The maternal mortality rate for the States and years included was 64.1 if based on the 7,537 deaths; 62.7 if based on the 7,380.

Causes of Death.—After the interviews the 7,380 deaths attributed to the various puerperal causes were divided as follows: accidents of pregnancy 719 (10 per cent); puerperal hemorrhage 791 (11 per cent); other accidents of labor 652 (9 per cent); puerperal septicemia 2,948 (40 per cent); puerperal phlegmasia alba dolens, embolus, sudden death 344 (5 per cent); puerperal albuminuria and convulsions 1,900 (26 per cent); following childbirth not otherwise defined 23, and puerperal diseases of the breast 3. The findings resulting from special analyses of the deaths in these cause groups, which are discussed in detail in the report of the study, cannot be given here for lack of space.

Race and Nativity.—The 1,308 deaths of colored women made up 18 per cent of the 7,380 included in the study. The maternal mortality rate for colored women (108.5 per 10,000 live births) was nearly twice as high as that for white women (57.5 per 10,000 live births). The rates were higher among colored women for every main cause of death except puerperal phlegmasia alba dolens, embolus, sudden death; the greatest difference was in puerperal albuminuria and convulsions, which caused 33.8 deaths per 10,000 live births among colored and 14.1 among white women.

Fourteen per cent of the white women, the place of whose nativity was reported, were foreign born. The maternal mortality rate among these women was 65 as compared with 55 for the native born white women.

Deaths in Urban and Rural Areas.—Under urban areas are included all cities with 10,000 or more population, as shown in the 1920 census. The maternal mortality rate was higher in urban districts (75 per 10,000 live births) than in rural districts (55 per 10,000 live births). The rates for the groups "accidents of pregnancy," "other accidents of labor," "puerperal septicemia," "puerperal phlegmasia alba dolens" were significantly higher in urban than in rural areas. There was no significant difference in the other main causes of death. The greatest difference was in the mortality rates from puerperal septicemia (urban 33.5, rural 19.6) and the difference in this rate was largely due to the higher rates from septic abortion in the cities than in the rural areas. The factor of residence could not be evaluated as it was impossible to obtain data on the residence of all the mothers of live-born children. However, the urban rate was undoubtedly raised by the deaths in urban hospitals of nonresidents who had been delivered in rural areas.

Medical Attention.—Nine per cent of all the deaths were of women who had had

no medical care whatever, or had care only when dying. Lack of medical attention was not always associated with inaccessibility of the physician, but it was more frequent when there was no physician living in the vicinity. Yet even in cases of women having a physician nearby, 7 per cent of the number for whom medical attention was reported had no care or care only when dying. Poor roads and slow transportation were apparently greater factors in inaccessibility than mere distance.

Hospitalization.—Of the 7,380 women included in the study there was a report on hospitalization for all but 14. More than half—4,213 women—had been hospitalized at some time during their final illness. The deaths of 4,066 of the 4,213 occurred in hospitals, but the deliveries or abortions of only 2,629 had occurred in hospitals. Of the 4,066 women whose deaths occurred in hospitals 2,501 had reached the last trimester of pregnancy; 1,558 died before reaching the last trimester; for 7 there was no report on period of gestation. Only 1,893 of the 2,501 women who were known to have reached the last trimester were actually delivered in the hospital for delivery and only 845 of the 1,893 were known to have had planned hospitalization. Hospitalization was less frequent and more of it was of an emergency nature among the colored women than among the white women.

Period of Gestation.—Thirty-two per cent of the 7,346 women concerning whom period of gestation was reported died before reaching the last trimester of pregnancy. Of the 2,381 deaths in the first two trimesters, 59 per cent were due to puerperal septicemia, 24 per cent to accidents of pregnancy, 14 per cent to puerperal albuminuria and convulsions, and 2 per cent to puerperal phlegmasia alba dolens, embolus, sudden death. Of the 4,965 deaths in the last trimester, 31 per cent were due to puerperal septicemia, another 31 per cent to puerperal albuminuria and convulsions, 16 per cent to puerperal hemorrhage, 13 per cent to other accidents of labor, 3 per cent to accidents of pregnancy, and 6 per cent to puerperal phlegmasia alba dolens, embolus, sudden death.

Abortions.—Abortion, as used in this study, may be defined as the termination of a previable uterine pregnancy. Deaths certified as due to criminal abortion are assigned to homicide in the International List of Causes of Death, and therefore are not included in "maternal mortality." However, abortions not certified as criminal were not excluded from this study, even if the attending physician knew or was convinced that they were criminal.

Of the 2,381 deaths before the seventh month of gestation, 1,825 followed abortion, 554 did not follow abortion, and for 2 this was not reported. Of the 1,825 deaths following abortion 1,324 were attributed to puerperal septicemia, 290 to accidents of pregnancy, 163 to puerperal albuminuria and convulsions, 44 to puerperal phlegmasia alba dolens, embolus, and sudden death, and 4 to puerperal hemorrhage. The 1,324 deaths from sepsis following abortion constituted 45 per cent of the total number of deaths from puerperal septicemia.

The type of abortion was reported in 1,588 of these 1,825 cases. Of these, 794 (50 per cent) were induced (other than therapeutic) 589 (37 per cent) were spontaneous, and 205 (13 per cent) were therapeutic.

A report concerning operations was obtained for 1,777 of the 1,825 cases in 992 (56 per cent), of which there had been some operation. The most frequent operation was curettage. Of the women who had spontaneous abortions 212 (36 per cent), and of those who had induced abortions 289 (37 per cent) had been curetted. Evidently many physicians did not consider fever a contraindication for curettage, for 448 (69 per cent) of the 652 women who had abortions and were curetted were reported to have had fever before the curettage. Puerperal sepsis caused 94 per cent of the deaths of these 448 women, as compared with 50 per cent of the deaths of women who were afebrile before the curettage and 68 per cent of the deaths of the women who had no curettage.

Married women made up 90 per cent of the women whose deaths followed abortion, but abortion was a more frequent cause of death among unmarried than among married mothers, for abortion preceded the deaths of about one-fifth of the married mothers and of more than one-third of the 509 unmarried mothers included in the study.

The mortality rate for deaths following abortion was higher among the colored than among the white women and among urban women than among rural women. The difference between urban and rural groups was most marked in induced abortions, for which the mortality rate was 11 per 10,000 live births in urban districts as compared with 4 in rural districts. The proportion of maternal deaths that followed abortion in the various states ranged from 18 to 37 per cent. The variation was greatest for induced abortions, which ranged from 3 to 23 per cent of all maternal deaths.

Live Births and Stillbirths.—Only 3,091 (43 per cent) of the 7,226 women for whom the type of issue was reported gave birth to living children. Twenty per cent were delivered of stillborn children of more than seven months' gestation. Twenty-nine per cent had nonviable issue, and 8 per cent died undelivered. In this study the term "stillbirth" is used only of dead-born issue of seven or more months' gestation.

Parity.—Primiparae made up one-third and multiparae two-thirds of the 6,854 women in the study for whom the number of pregnancies was reported.

Illegitimacy.—The deaths of 509 unmarried women were included in the study. Omitting from the calculations California, where data on legitimacy are not given in the birth certificate, the maternal mortality rate for the unmarried women was 143 per 10,000 illegitimate live births, while the rate for the married women was 60 per 10,000 legitimate live births. The rates were higher for the unmarried women in both the white and colored groups. Puerperal septicemia caused 51 per cent of the deaths of unmarried and 39 per cent of the deaths of married women, puerperal albuminuria and convulsions 32 per cent of the deaths of unmarried and 25 per cent of the deaths of married women. The deaths of 186 unmarried women followed abortion; 129 of them were reported to have been induced abortions.

MATERNAL CARE

In this study attention was confined largely to the medical aspects of maternal care.

All the cases in the present study were eventually abnormal, for all these women died. The details of the care given them were frequently determined by that abnormality. Of the 7,380 women whose deaths are included in this study only 616 were known to have had no complication of pregnancy and no intercurrent disease. Only 199 of the 616 were reported to have had normal spontaneous deliveries in the last trimester, a normal third stage of labor and no postpartum hemorrhage. The deaths of 100 of these 199 women were due to puerperal sepsis, 55 to puerperal phlegmasia alba dolens, embolus, sudden death, 23 to other accidents of labor, 15 to puerperal albuminuria and convulsions, and the other 6 to other puerperal causes. It should be borne in mind that a large number of women who had no prenatal care or about whose care during pregnancy nothing was known were for obvious reasons not included in the group just discussed.

Prenatal Care.—In the study of prenatal care the 1,154 cases in which either there had been an induced abortion or pregnancy had terminated before the third month were for obvious reasons excluded. In 590 cases no report on prenatal care could be obtained. The group for which prenatal care was studied consists, therefore, of 5,636 women.

Of these 5,636 women 3,025 (54 per cent) had no prenatal care whatever.

The grading of the prenatal care received was based on examinations only, not on treatment; and on the period of pregnancy at which it began rather than on its duration as it might be limited by the early termination of pregnancy. Thirteen per cent of the 5,636 (725 women) had "good" care although not up to the highest standards, which began not later than the fifth month. Forty-two of the 725 apparently had had adequate care as prescribed in Standards of Prenatal Care.¹ The term "indifferent" may be used to describe the prenatal care received by 499 women (9 per cent). This began not later than the seventh month. "Poor" prenatal care was received by 1,337 women (24 per cent). Fifty women (1 per cent) had some prenatal care, but sufficient information to grade it could not be obtained.

Only 16 per cent of the 2,611 women who had some prenatal care were known to have had a Wassermann test and 44 per cent to have had pelvic measurements (including 20 per cent who probably had external measurements only). Apparently 79 per cent had at least one blood-pressure examination.

The type of prenatal care that can be given depends upon the promptness with which the pregnant woman presents herself to a physician. Of the 2,611 women who had some prenatal care, 1,478 first visited the physician in or before the fifth month, so they were seen early enough to be given "good" care, if the other requirements had been met. Forty-nine per cent of these women received "good" care, 16 per cent had "indifferent" care, and 34 per cent had "poor" care; the care received by 9 women could not be graded.

Fifty-five per cent of the women who died before they reached the last trimester died too early in pregnancy to have been expected to have prenatal care, or had induced abortions, or else information concerning their care was not obtained. But of the remaining 1,064 women, 17 per cent had "good" care, 3 per cent had "indifferent" care, 14 per cent had poor care, the care received by 1 per cent was ungraded and 66 per cent had no care.

Of the 4,570 women who died after reaching the last trimester and for whom a report was obtained concerning prenatal care, 12 per cent had "good" care, 10 per cent "indifferent" care, 26 per cent "poor" care, 1 per cent was ungraded, and 51 per cent had no care. Twenty-four per cent of those who died following "good" care, and 34 per cent of those who had had no care, died of puerperal albuminuria and convulsions.

Considering only the women for whom a report as to prenatal care is available and applicable 14 per cent of the primigravidae and 22 per cent of those in their second pregnancy had good care, while 46 per cent of the former and 39 per cent of the latter had no prenatal care whatsoever. After the second pregnancy the amount of good prenatal care decreased with the number of pregnancies, and the percentage of those who had had no prenatal care rose with the number of pregnancies.

Among the 4,843 cases of women who had reached the last trimester in which there was a report on the character of issue, 70 per cent were live births for the mothers who had had "good" or "indifferent" prenatal care, 63 per cent for those who had had "poor" care, and 58 per cent for those who had had no prenatal care.

Prenatal care was much more frequent among the white than among the colored women, and in both groups prenatal care was more frequent in the urban districts than in the rural districts. The quality and amount of prenatal care given varied greatly in the different States included in the study. In general, the States in which

¹Standards of Prenatal Care; an outline for the use of physicians, U. S. Children's Bureau Publication No. 153. Washington, 1925.

more of the women who died had had "good" care had lower mortality rates from puerperal albuminuria and convulsions.

Delivery Care.—The actual evaluation of the factors determining the adequacy of care at delivery is obviously difficult. In this study no attempt was made to grade the types of delivery care given, but the simplest and most objective of the factors involved were studied separately.

Place of Delivery.—Of the 4,965 women who reached the last trimester of pregnancy, 1,971 were in hospitals for delivery or at the time of death if they died undelivered. The hospitalization of 899 of these women was planned, but for 1,018 it was an emergency, for 54 there was no report. For 4 the place of delivery was not reported, and the remaining 2,990 were delivered or died undelivered outside of hospitals. The hospitalization of white women was much more frequent than of colored women. Maternal mortality rates for hospitals and for homes cannot be given because data regarding the total number of deliveries in hospital and in homes are not available; but even if there were such data, the large and varying proportions of complicated cases among those delivered in hospitals invalidate comparisons.

Attendant at Confinement.—Information on the attendant at the delivery or the death if the patient died undelivered was obtained for 4,903 of the 4,965 women who died after reaching the last trimester. Of these 4,903, 4,065 (83 per cent) were attended exclusively by physicians, internes, or medical students. Midwives attended 550 women (11 per cent) including 193 for whom physicians were called in before the delivery was completed. Nonmedical attendants such as relatives attended 172 women, and 116 women were said to have been unattended.

Practically all the midwives who cared for these women were untrained. Of the 550 women attended at confinement by midwives 462 died in Alabama, Kentucky, Maryland, and Virginia, and these 4 were the only States of the 15 in the study in which the number of deaths of women attended by midwives constituted 10 per cent or more of the total number of deaths of mothers who had reached the last trimester. In Alabama, Maryland, and Virginia the proportion of midwife-attended confinements among the women who died was very slightly smaller than the proportion of midwife-reported births among the total live births of the State.

Technic of the Physician.—The technic of the principal physician at confinement was described by him in 3,619 of the 4,305 cases in which a physician attended women in the last trimester. In 48 per cent an aseptic technic was said to have been used. This included shaving, scrubbing, sterile drapes, instruments, and rubber gloves, and adequate assistance at delivery. In 14 per cent the technic was classed as attempted aseptic; in 30 per cent, as clean but not sterile, and in 7 per cent as dirty. In many cases the principal physician whose technic was assigned to one of the first three classes was preceded by some one whose technic was less careful.

The principal physician made vaginal examinations in 2,765 cases and made no vaginal examinations in 1,089 cases; in 451 cases there was no report on this matter; and in 660 cases no physician was in attendance. The principal physician had made one vaginal examination in 871 cases, two in 565 cases, and three or more in 771 cases; in 558 cases the number was not given. Of the 2,765 cases in which the principal physician made vaginal examinations, rubber gloves were reported used in 2,188 cases, not used in 484 cases, and there was no report on their use in 93 cases. Rectal examinations were reported as having been made by the principal physician in 778 cases; in 326 of these he made one or more vaginal examinations also.

There was a report on the use of pituitrin in 3,718 of the 4,305 last-trimester cases with a physician in attendance. Pituitrin was said to have been used before the delivery of the child in 711 cases, after the delivery of the child only in 1,004 cases, and at an unreported stage of labor in 24 cases. In 1,979 cases pituitrin was

said not to have been used. In the group of cases in which pituitrin had been used before the delivery of the child larger proportions of the deaths were from puerperal septicemia and puerperal hemorrhage and a smaller proportion was from puerperal albuminuria and convulsions than in the group in which no pituitrin had been used.

OPERATIONS

More than half of the women whose deaths were studied had some operative procedure. Of the 7,234 women concerning whom there was a report on this point, 3,370 (47 per cent) had had no operation, while 2,649 (37 per cent) had had an operation directed toward delivery and 1,131 (16 per cent) had had some operation other than for delivery. By an operative delivery is meant an operation for the purpose of delivering the fetus or for the immediate removal of the placenta. Attempts at these operations, as well as completed operations, are included. Other operations were secondary, usually on account of sequelae of the delivery.

Operations in the First Two Trimesters.—The 205 therapeutic abortions and the 195 laparotomies for ectopic gestation made up nearly all the operations for delivery performed in the first two trimesters. Various other operations were performed in conjunction with or on account of sequelae of some of the operations for ectopic gestation, but in only 26 cases was this other operation a blood transfusion. Of the 205 women who had had therapeutic abortions, 38 had some other operation besides—a second curettage, a blood transfusion, or packing of the uterus because of hemorrhage. Fourteen of the 38 women had laparotomies subsequent to the therapeutic abortion.

At least one curettage had been done on 585 women who had had a spontaneous abortion or an induced abortion other than therapeutic. Fifty-three women who died before the third trimester had had blood transfusions as their only operation. Another group (82) who had had no operation for delivery, had laparotomies performed for various complications.

Operations in the Last Trimester.—Operations for Delivery: Of the 4,965 women who reached the last trimester of pregnancy, 2,225 (45 per cent) were known to have had an operative delivery, or an attempt at operative delivery.

Forceps: Forceps operations were performed 718 times. (In addition, there were 98 cases of forceps and version combined; usually when forceps failed the delivery was completed by version.) In 150 of the 718 cases the application of forceps followed induction of labor or artificial dilatation of the cervix. In 24 cases the use of forceps was followed by manual removal of the placenta. In 12 cases all three procedures were used. In 14 cases forceps was used in combination with some other operation. Of the total of 162 cases in which the use of forceps followed induction of labor or artificial dilatation of the cervix, 106 were of women who were not in labor when the artificial dilatation of the cervix was begun.

Version: Version was the principal obstetric operation in 618 cases, including the 98 cases in which forceps was used in conjunction with version, or 520 cases in addition to the 98. In 224 of these 520 cases version followed artificial dilatation of the cervix: in 26 cases it was followed by manual removal of the placenta, in 48 cases it was accompanied by both dilatation of the cervix and manual removal of the placenta, and in 4 cases it was accompanied by some other operation or a combination of operations. Therefore in a total of 272 cases version was preceded by dilatation of the cervix; 84 of these were cases in which labor had begun spontaneously. In 172 cases the dilatation was done to induce labor as well as to facilitate delivery. Six of these women died undelivered after attempts at version had failed.

Cesarean Section: Cesarean section preceded the deaths of 531 (11 per cent) of the 4,832 women who died after reaching the last trimester, 24 per cent of all who had operations for delivery in this period.

The causes of the deaths following cesarean section as given on interview by the attendant physicians were: Accidents of pregnancy, 3; puerperal hemorrhage, 42; other accidents of labor, 146 (including cesarean section, 136); puerperal septicemia, 143; puerperal albuminuria and convulsions, 202; and embolus and sudden death, 1.

The indications for cesarean section were varied and combinations of indications were frequent. The principal indications given were: Some form of toxemia, 239 cases, including eclampsia in 165; absolute or relative disproportion or long labor, 144; conditions associated with hemorrhage, 62; abnormal presentation, 33; previous cesarean sections, 17; some other indication, 42.

Eighty-two of the 537 cesarean sections were planned, 452 were emergency, and in 3 cases there was no report on this.

Cesarean section followed attempts at other forms of operative delivery in the cases of 62 women, 42 of whom were primiparas.

Ether was the most common anesthetic used. It was used alone in 275 of the 480 cases for which this information was obtained, in other cases in combination with some other anesthetic. Nitrous oxide oxygen anesthesia was used alone in 56 cases and with ether in 62 cases. Ethylene was used in 41 cases and chloroform in 14 cases. Local anesthesia was used in only 19 cases, in 5 of which it was supplemented by nitrous oxide or ether and in 1 case with sacral anesthesia. Spinal anesthesia was used in 8 cases.

The duration of labor was reported for 495 of the 531 women dying from cesarean section in the last trimester of pregnancy. Of the 250 who were not in labor, the cause of death in 11 per cent was puerperal septicemia. Of the 245 women in labor for whom the number of hours was reported, 38 were in labor less than six hours; 35, from six to twelve hours; 51, from twelve to twenty-four hours; 32, from twenty-four to thirty-six hours; and 89, more than thirty-six hours. With increase in the duration of labor, the percentage of deaths that were assigned to puerperal septicemia rose rapidly, from 29 per cent for those in labor less than twelve hours to 51 per cent for those in labor thirty-six hours or more.

Vaginal examinations by the operating physician preceded the cesarean section in 52 per cent of the cases in which this information was secured. Of the 231 women who had no vaginal examination by the operating physician, 20 per cent died of sepsis and 43 per cent of albuminuria and convulsions; but of the 254 women who had vaginal examinations, 34 per cent died of sepsis, and 30 per cent of albuminuria and convulsions.

Other Operations for Delivery.—The cervix was dilated manually, by bags or by other artificial means for 112 women, of whom 89 delivered spontaneously and 23 died undelivered. Four of the 89 women who delivered spontaneously after dilatation of the cervix also had a manual removal of the placenta. Manual removal of the placenta followed a spontaneous labor and delivery in 87 cases. Other operations included 65 breech extractions, 57 craniotomies and embryotomies, and 8 laparotomies for abdominal pregnancy. Twenty women had some other operation or other combination of operations, and 9 had some operation for delivery, but its type was not reported. For 133 women no report could be obtained as to whether or not there had been an operative delivery.

Prenatal Care.—Of the 1,879 women who died following operative termination of labor in the last trimester of pregnancy, and for whom there was a report as to prenatal care, 807 had no prenatal care; that is, 43 per cent of the operative deliveries were on women whom the physician had not seen before labor or before the acute emergency.

Age and Parity.—The frequency of versions increased, and frequency of forceps decreased, with the number of pregnancies. Cesarean sections preceded the deaths of 17 per cent of the primiparae, 12 per cent of the secundiparae, 8 per cent of the women who had had three to five pregnancies, and 5 per cent of those who had had six or more pregnancies, who died after reaching the last trimester.

The incidence of operations for delivery increased with age both for primiparae and for multiparae. Among primiparae there was a definite increase with age for cesarean sections; 33 per cent of the last-trimester deaths of primiparae of 30 years or older were preceded by cesarean section. Among multiparae there was a definite increase with age for forceps, version, and cesarean section.

Incidence.—The deaths of white women were more often preceded by operative deliveries than those of colored women, and the deaths were more often preceded by operative deliveries in the urban than in the rural districts. The proportion of maternal deaths that were preceded by operations for delivery in the last trimester ranged from 34 to 57 per cent in the States studied.

The percentages of maternal deaths that were preceded by cesarean section in the last trimester ranged from 2 to 24 per cent in the States studied, and in the 15 States the incidence was 17 per cent among the urban white, 16 per cent among the urban colored, 7 per cent among the rural white, and 4 per cent among the rural colored.

Operations Other Than for Delivery.—Some operation other than the actual delivery of the child or of the placenta was performed on 636 women who died after reaching the last trimester, of whom 301 also had an operative delivery. Most of these other operations were done for conditions resulting from the delivery. These operations included curettage, packing of uterus or cervix, blood transfusions, laparotomies for drainage of peritonitis and a smaller number of enterostomies, appendectomies and hysterectomies. Combinations of operations were frequent.

COMMENT

The following are excerpts from the *Comments on the Study by the Obstetric Advisory Committee* based on the findings as given in the complete report, and on the study of individual schedules:

In this study the International List of Causes of Death as applied in the *Manual of Joint Causes* in use by the United States Bureau of the Census has been used as the chief basis of classification. While this procedure was not entirely satisfactory from a medical point of view, the inherent disadvantages seemed counterbalanced by the fact that it provided a definite and understandable classification, and that its use would assist the comparison of the findings with those of other investigators.

Certain changes in classification resulted after the interviews. These alterations which were made necessary by various causes emphasize the dependence of the official statistics on the original death certificate and the apparent unavailability of a small percentage of error. A relatively small number of cases were excluded as nonpuerperal. These cases are easily equaled or exceeded by those that were actually puerperal but that were classed in the vital statistics as nonpuerperal and so were not included in the study. Therefore, maternal mortality rates as given in this study are probably lower than the actual rates.

Autopsies were held in less than 8 per cent of the cases, and many of the autopsies were done by coroners. It is apparent that there was gross lack of scientific study of the puerperal deaths included in the study.

The exceedingly high death rate among colored mothers is especially challenging when considered in connection with the poor maternal care that was received by these colored women.

The differences between urban and rural rates cannot be fully explained by this study, as complete information on residence is not available. It is apparent, however, that two of the factors contributing to the higher urban rates are the larger proportion of abortions in the urban than in the rural communities and the deaths in urban hospitals of women who were delivered in rural areas. The exact value of the second factor cannot be determined from this study for reasons given in the report.

Nine per cent of the women had no medical attention whatever or else had attention only when they were actually dying. Only part of this was due to physical inaccessibility. Inaccessibility due to distance and bad roads, however, was a serious problem in certain localities of the States studied. The part played by inaccessibility in the lack of *early*, as distinguished from *any*, medical attention was not measured; but the larger proportion of deaths from hemorrhage and the toxemias in the less accessible groups is suggestive, especially when considered in conjunction with the lack of prenatal care among women who died in the rural areas.

It is impossible to draw conclusions as to the relative safety of deliveries in hospitals and homes from a study of deaths alone. Data regarding the total number of deliveries in hospitals and homes were lacking. Many hospital deaths followed home deliveries, and many of the hospital deliveries were emergency cases. However, there were too many deaths of women who had planned hospital deliveries in the last trimester.

The figures relative to stillbirths and live births indicate strikingly the appalling loss of fetal life associated with maternal deaths; 37 per cent were either undelivered or previable infants, 20 per cent of the viable fetuses were stillborn, and only 43 per cent are credited as being live births. The number of these infants who died or were damaged survivors, was not possible to determine from this investigation.

One-third of the deaths were of women who had not reached the last trimester of pregnancy. Duration of pregnancy is a most important consideration in the evaluation of any statistics on maternal mortality.

Illegitimacy contributes to maternal mortality, as 7 per cent of the deaths in this study were of unmarried women and the mortality rate is much higher for unmarried than for married mothers. There was a larger proportion of abortions among the unmarried, and the deaths from such preventable causes as sepsis and toxemia were relatively more numerous among the unmarried mothers. Social and economic factors doubtless play an important rôle in creating this mortality, and they should be adjusted to prevent this loss of life.

Abortions.—The fact that one-quarter of all the maternal deaths in this study followed some type of abortion is probably the most outstanding finding of the study.

The most frequent operation in the management of these abortions was curettage, usually with sharp instruments, which is a procedure definitely to be condemned.

This study shows very clearly the seriousness of the problem created by the great number of abortions that are induced each year. . . . Physicians must be made to appreciate the seriousness of curetting these potentially septic cases. The management of an abortion calls for the best medical care that can be given, and in many of the cases in this series it is obvious that such care was not given. The abortion problem cannot by any means be solved by the medical profession alone. It is a widespread sociologic and economic problem, which the medical profession must have help in solving. However, the physician has one great obligation, to teach the public the dangers entailed by abortion, whether spontaneous or induced.

Maternal Care.—It is discouraging to find that of the women on whom a report as to prenatal care could be obtained and who could reasonably have been expected to have such care, 54 per cent had had no prenatal examination by a physician.

In only 1 per cent was the care given up to the standard that it is the right of every pregnant patient to have and to demand.

For the deaths of the women who had had no prenatal examination the attending physician could hardly be held responsible, for he was not consulted until an emergency had arisen. Gross ignorance, carelessness, and sociologic and economic problems all had a share in this responsibility. However, in those cases in which the physician was consulted he was responsible for providing adequate maternal care; and in many of these cases physicians failed in their responsibility for half the women who did consult a physician had poor prenatal care.

Evidence for the value of prenatal care may be found in the fact that smaller proportions of the women who died after good prenatal care than of those who died after poor prenatal care died of puerperal albuminuria and convulsions. Further evidence may be found in the larger proportion of live births in those cases in which there had been good prenatal care; and in the fact that those States with more good prenatal care even among the women who died had lower death rates from albuminuria and convulsions.

Primiparas and the mothers of many children particularly need prenatal care, but a smaller proportion of these women received it.

Delivery care, though as important as prenatal care, was more difficult to evaluate in a study of this sort, but there are certain facts to be noted. For more than half of the women who died in hospitals, hospitalization was an emergency measure. Among the colored women emergency hospitalization was much more frequent than among the white women.

Figures given in the report would indicate that though the midwives played a part in the mortality they could not have been responsible for any large proportion of the deaths because they attended a relatively small percentage of the cases.

No study of the qualifications of the individual physicians or midwives was attempted. As it was known, however, that the majority of the midwives were ignorant "grannies," it may safely be assumed that these midwives did not use a satisfactory aseptic technic at delivery. In 48 per cent of the cases the physicians described their technic in such a way that it was classified as aseptic, but obviously there is no way of determining how good this technic was; it may have been described as better than it really was. The point to be noted is that the physicians themselves admitted it was unsatisfactory in more than 50 per cent of the cases. The frequency of vaginal examinations, oftentimes without gloves, is clear, and the relatively few rectal examinations must be noted.

Although the data on the use of pituitrin are incomplete its use is shown to be common and to be associated with serious accidents.

Operations.—The physicians who delivered these patients cannot be blamed in all cases for the results obtained, for in 43 per cent of these operative deliveries they had not seen the women before labor or before the acute emergency had occurred. Under these circumstances it is a well recognized fact that the operation of election is not always possible; the physician many times is forced to do something which he appreciates may not be the best but at the time seems justifiable. This shows from another point of view the absolute necessity, if our maternal mortality is to be lowered, of insisting upon continuous prenatal and adequate delivery care.

In nearly 40 per cent of these operative deliveries it was admitted by the physicians that their technic was at least unsatisfactory with regard to asepsis.

Many of these patients were operated upon after very little or no labor, and this explains the frequency of artificial dilatation of the cervix in both forceps and version deliveries. The number of cases in which manual dilatation of the cervix, forceps or version, and manual removal of the placenta occurred, or forceps failed and version was done, was deplorably large. From this it is evident that accouche-

ment forcé was resorted to many times and accouchement forcé is not regarded as good obstetrics today; it gives bad results and should not be performed.

The frequency with which a curettage was done on women who had developed sepsis is surprising, for such treatment has long been condemned. Secondary operations for various conditions, usually of a septic nature, were much too common.

The very fact that cesarean sections preceded one-fourth of all deaths following operations for delivery suggests that there had been unwise selection of cases for the operation, or of the types of operation, or both, as cesarean sections constitute only a small percentage of all operative deliveries in general. Additional evidence to this effect is found in the causes of the deaths following cesarean section. According to statements of the doctors upon interview, 27 per cent of the women died of sepsis, but careful study of each record indicates that 47 per cent were probably septic. The conditions under which the operations were done may account for this high percentage of sepsis. Eighty-five per cent had not been planned. In 31 per cent the membranes were ruptured before the operation was done. Fifty-two per cent of the women had had one or more vaginal examinations. Twelve per cent of the women had had attempted delivery from below. The number of sections done for various types of dystocia after long and exhausting labors is appalling. The tremendous mortality attending cesarean sections throughout the United States warrants a careful review of the indications in the choice of operation.

Kimura, S.: Clinical Observations on Uterus Bicornis in Pregnancy and Labor.
Japanese J. Obst. & Gynec. 13: 154, 1930.

In 52 cases of uterus bicornis, Kimura observed the symptoms of hypoplasia. The average age of puberty was somewhat later than for other women. The percentage of conception was 69.4 per cent and pregnancy was generally associated with complications. Spontaneous, premature labor occurred in 87.5 per cent of the cases. The cause is usually hypoplasia of the uterine musculature. Not one case of twin pregnancy was noted. Among 11 patients who went to term 7 had breech and 4 had occiput presentations. Premature rupture of the membranes occurred in 72.7 per cent. The vaginal septum gave no trouble, and in 4 of the 11 cases it ruptured spontaneously. Labor was usually complicated. Three patients had severe postpartum hemorrhages and one had retention of the placenta. The puerperium was normal in most of the cases.

J. P. GREENHILL.

Society Transactions

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 10, 1933

The following case reports and papers were presented:

Report of a Case of an Unusually Large Ovarian Cyst. Dr. Gordon Gibson.
(See page 264.)

Acute Inversion of the Uterus. Dr. G. H. Davis (by invitation). (See page 249.)

Sexual Variations of the Pelves and Their Significance in Labor. Drs. W. E. Caldwell and H. Moloy. This paper will be published in the October issue.

DR. B. P. WATSON.—I have had the privilege of following the work that Dr. Caldwell and Dr. Moloy have been doing on these various types of pelves. I think one of the first things I heard when I came to this city, now nearly seven years ago, was of this male type of pelvis which Dr. Caldwell had become interested in along with his former chief, the late Dr. Studdiford.

It is very extraordinary that obstetricians should have been ignorant of the work which the anatomists and anthropologists had been doing for a great many years on pelves and especially on overlapping in sex characteristics. I can say that because I knew personally two of the men whom Dr. Moloy mentioned as pioneers, or rather not quite as pioneers but workers in this subject, the late Dr. Berry Hart, whose pubiotomy pelvis Dr. Moloy showed, and Dr. Derry, who was a fellow-student of mine in Edinburgh and afterward was Professor of Anatomy in Cairo, and who did his work on the pelvis in identifying and in trying to sex mummies.

I think the presentation we have had is epoch-making in obstetrics. Dr. Caldwell and Dr. Moloy have put something before us which is really worth while, which will lead to a great deal of further investigation and which is going to elucidate many of the obstetric problems which have been puzzling us hitherto, the difficult labor in the woman in whom we thought the ordinary pelvic measurements were normal. It is only when we come to study the outlet, the subpubic angle, the interischial diameter, and above all, the height of the symphysis, the depth of the pelvis, and the form of the sciatic notch that we recognize that there is likely to be difficulty.

Their classification, I think, is a very good working classification at present, but as Dr. Moloy said, this may be subject to modification as the work goes on. The pelvis as they have described it accounts for many of the occipitoposterior positions. Other workers, Thoms especially, have related occipitoposterior positions to pelvic deformity, but no one has hitherto shown us clearly why it is that the head must present in the occipitoposterior position in certain types of pelves. The point Dr. Moloy made that in certain occipitoposterior positions it is very much better and easier to deliver the head occipitoposterior than to try to rotate it, is very important.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING DECEMBER 1, 1932

The following papers were presented:

Torsion of the Normal Fallopian Tube. DRs. F. B. BLOCK and M. A. MICHAEL. (See page 268.)

Influence of Female Sex Hormone Upon Blood Coagulation of the Newborn. DR. JOHN C. HIRST. (See page 217.)

The Results of Intrauterine Culture as Obtained With the Sheath Tube. DR. J. K. JAFFE. (See page 212.)

MEETING OF JANUARY 5, 1933

The following papers were presented:

The Incidence and Significance of False Positive Pregnancy Reactions. DR. A. J. ZISERMAN. (See page 204.)

The Value of the Aschheim-Zondek Reaction in the Diagnosis and Prognosis of Chorionepithelioma. DR. C. MAZER AND DR. L. EDEIKEN. (See page 195.)

Direct Intraabdominal Radiation in Advanced Pelvic Carcinoma. DR. E. A. SCHUMANN. (See page 260.)

Observations on the Endocrine Diagnosis and Treatment of Amenorrhea and Functional Uterine Bleeding. DR. B. M. ANSPACH AND J. HOFFMAN. (See page 147.)

MEETING OF FEBRUARY 2, 1933

The following paper was presented:

Nephritis in Pregnancy. DR. H. J. STANDER. (See page 183.)

BROOKLYN GYNECOLOGICAL SOCIETY*MEETING OF DECEMBER 2, 1932*

The following case reports were presented:

Abruptio Placentae (Complete) With Spontaneous Partial Rupture of the Uterus. DR. S. L. SIEGLER (by invitation). (See page 270.)

Report of Three Cases of Ruptured Uterus Following Previous Cesarean. DR. J. CASAGRANDE. (See page 273.)

Correspondence

"A Simple Procedure of Ascertaining the Sex of the Newborn, Where the Diagnosis Is Difficult Due to Genital Abnormalities"

In the June issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, Dr. Witherspoon, of New Orleans, describes, under the above caption, what he pronounces an infallible method of determining the sex in the case of a baby with genital malformations. I read his description with much interest, but could not agree as to the positiveness of the diagnosis. In the course of my work in constructing artificial vaginas I have had occasion to examine an unusually large number of cases of genital malformations, in some of which the determination of the sex was by no means easy; but I cannot understand why in the examination of such infants the direct passage of a catheter into the bladder would determine, as claimed by Dr. Witherspoon, that the child is a male. Most of the cases which I have examined have been babes or young girls born without a vagina, and usually with other sex malformations. In those cases the catheter would certainly go directly into the bladder, and by the above test all would have been immediately pronounced males.

In one of my early cases, the patient being about twenty-five years of age with a most distressing inferiority complex, there was a large clitoris present, immediately below which was an opening, just as shown in Dr. Witherspoon's illustration, through which the catheter passed directly into the bladder. The perineum extended forward to this opening, and there was very little tissue in the vicinity to suggest a vulva. There had never been any menstruation or menstrual molimen. The breasts were well developed, and the general appearance of the patient was that of a female, but there was a peculiar voice and an unusual development of hair which suggested masculinity. (Whether the female sex had been determined at the time of her birth I do not know.) If, however, instead of passing the catheter clear into the bladder I turned the end directly downward just after it entered the meatus I could pass it backward through a sort of sinus into what proved to be a normal vagina.

At the operation I split the perineum backward until I reached the normal vagina; then, as best I could, I attached the mucous membrane of the vagina to the skin, constructed a pretty good vulva and amputated the clitoris. The vagina was found to be normal, and at the fundus was an infantile uterus. Because of the male manifestations, as shown by the voice and hair, I opened the abdomen. On the right side of the infantile uterus a normal tube and ovary were found but on the left was a normal testicle, which was removed. The patient made a prompt recovery, the inferiority complex disappeared, she was married that fall and scarcely a year elapses that she does not drop in to express her gratitude and assurance that she is "the happiest woman in Ohio." She is one of the most active women in her town.

In consulting available literature on the development of this part of the embryo, I fail to find anything to confirm the view of Dr. Witherspoon. The illustrations, especially figure "B" on page 236 of *Embryology* by Charles W. Prentiss, of the University School of Medicine of Chicago (1915), seem to suggest the ease with which the vagina could pass forward so as to enter the urethra at right angles and produce just such a condition as I found in the case alluded to above; and yet in such a case in introducing a catheter it would slip directly into the bladder. I have discussed this matter quite at length with Professor Landacre, Professor of Embryology in the Medical Department of the Ohio State University, who fully confirms my view as to the inadequacy of the proposed test. I am quite certain that by that test practically all babies with absence of vaginas would be forthwith pronounced males.—J. F. BALDWIN, M.D., Columbus, Ohio, July 10, 1933.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EIRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

TRENDS IN GYNECOLOGY AND OBSTETRICS DURING 1932

J. P. GREENHILL, M.D., CHICAGO, ILL.

THIS year we are innovating a departure from the customary, yearly collective review. Instead of discussing individual papers we attempt to review tendencies in gynecology and obstetrics. For this purpose we have gone over the topics chosen for discussion at various national and local obstetric and gynecologic societies in the United States, Great Britain, Germany, Austria, Hungary, Japan, Switzerland, Belgium, Italy, and Scandinavia. A few papers of importance not read before any society but pertaining to the subjects under discussion have also been included. In recent years more progress has been made in gynecology than in obstetrics due particularly to advances in the study of endometriosis, radiotherapy, and endocrinology. Because of this, a disproportionately large amount of space in this review is devoted to gynecology.

ANALGESIA AND ANESTHESIA

One of the chief topics for discussion before the Royal Society of Medicine was "Modern Methods for Alleviating Pain in Childbirth." Rivett maintained that the ideal anesthetic was nitrous oxide gas and oxygen. He was of the opinion that chloroform is excellent as an analgesic but dangerous as an anesthetic. In the discussion Paramore advocated spinal anesthesia and episiotomy together with forceps delivery. Charles pointed out that gas and oxygen were satisfactory but it was impossible to have the necessary apparatus always at hand. In his experience the results with the barbiturates were not convincing, ether was objectionable, and chloroform was the best anesthetic of all. Gibbons likewise favored chloroform.

Stander (O)* reported the fifth case of delayed chloroform poisoning which occurred on the obstetric service of the Johns Hopkins Hospital. Four of the five patients died. The only hope for recovery in these cases is offered by intravenous glucose therapy and antiacidosis measures such as sodium bicarbonate intravenously. Stander emphasizes that the only place for chloroform in obstetrics is late in the second stage at which time it should be administered in whiffs. Even then it should be used only when no other anesthetic is available.

Ruth and Paxson (O.S.Pa.) found that sodium amytal has two disadvantages, first administration requires some technical skill and second the drug produces restlessness. When given intravenously in conjunction with nitrous oxide-oxygen, it presents the following advantages: An immediate positive action, accurate control of dosage, no injurious effect on mother or baby, no deleterious effect on labor, it furnishes a method of treating spastic cervix or retraction ring, and it gives definite rest. In discussing this paper J. C. Hirst said he observed that sodium amytal by mouth is much easier to administer and just as effective as the intravenous route. Rectal administration required excessive nursing attention because of restlessness. Paxson agreed that giving the drug by mouth is easier but the danger of restlessness is markedly increased. Pride (M.S.C.M.S.) obtained good results with rectal administration.

*For code see end of article.

Littell's studies (O) revealed that sodium amytal has no injurious effect on the newborn child when given in the customary doses as an obstetric analgesic or anesthetic. Nelson (O) believes the combination of sodium amytal and scopolamine causes complete amnesia in the majority of cases if given early. It does not slow labor or affect the baby, it saves general anesthesia and is far less expensive. Bohler (S.O.G.S.) obtained good results with pernocton but found that in at least one-fourth of the cases there was marked excitation requiring close supervision; the analgesia lasted only a relatively short time and in some cases there was a toxic effect on the baby.

Lull (O.S.Pa.) advocated the combined use of the barbiturates with ether by rectum but he cautions that the physician should be prepared to deliver the patient with outlet forceps. Vaux believes this combination should not be used as a routine and J. C. Hirst emphasized that patients receiving this combination must be watched after the birth of the baby as well as during labor.

In contrast to these favorable reports on the use of sodium amytal, the experience of Shir and Daichman (B.G.S.) with this drug has been disappointing. These authors found that in most cases large doses of the drug will give satisfactory analgesia, amnesia, and relaxation of the soft parts. However, these advantages are greatly outweighed by the frequent occurrence of marked restlessness, an increase in the number of instrumental deliveries and frequently narcotized babies.

Avertin is considered by Cochran (B.G.S.) to be a safe analgesic agent, it does not prolong labor or increase the incidence of operative delivery and it produces a successful state of analgesia and amnesia in most cases. Likewise Peterson and Pierce (O) believe avertin more nearly approaches the ideal anesthetic than any other drug which they employed. However, while Morgan (O) considers this drug to be safe it is nevertheless uncertain in its action.

Averett, Sussman and Zimring (O.S.Pa.) reported on the use of spinal anesthesia in 896 gynecologic and 35 obstetric cases. They obtained very satisfactory results with neocaine in the gynecologic cases and with gravocaine in the obstetric ones. Cosgrove (A.S.R.A.N.Y.A.M.) advocated lumbar anesthesia in obstetrics, and Siegert (O) highly recommends this form of anesthesia for cesarean sections. Gabriellianz (C.G.S.) favors spinal anesthesia in gynecology and considers spinocaine the safest drug. Eades (B.O.S.) is of the opinion that spinal anesthesia with novocaine crystals and spinocaine has a definite place in abdominal obstetric surgery when the use of general inhalation anesthesia is contraindicated. Holder (O) found nupercaine to be a safe and satisfactory agent for spinal anesthesia when used for operations below the diaphragm. Rouffart-Marin (B.S.G.O.) believes in the superiority of percaine for spinal anesthesia and Gengenbach (U.R.O.G.S.) said that percaine is preferred for spinal anesthesia at the Basel clinic. Mayer favored novocaine. Labhardt said that even though his results with spinal anesthesia have been good he preferred narcosis and direct infiltration anesthesia. Walthard also favored the latter form of anesthesia. Seitz mentioned that although he frequently used spinal anesthesia when most of his patients were peasants he seldom resorted to this form of anesthesia for his urban patients because of the frequency of headaches.

Frigyesi (V.O.G.S.) reported on 500 gynecologic cases in which he successfully induced anesthesia by infiltrating the abdominal wall with novocaine and injecting the anesthetic sideways into the region of the third lumbar vertebra. Finsler prefers parasacral and Adler favors direct infiltration anesthesia.

STERILITY

Before the Northern Scandinavian Society of Surgeons, Björkenheim discussed the causes and treatment of sterility in women. In only about 10 per cent of his 524 cases did he find the male at fault either directly or indirectly. He believes that hysterosalpingography is less dangerous than the Rubin test. Natvig is of the opinion that in Norway sterility is 8 to 9 times as frequent in women as in men, and that about one-third of all sterility in women is due to hypogenitalism and the rest to acquired diseases. Chydenius reported 30 cases in which he employed salpingography but Settergren considers the injection of iodized oil a dangerous procedure and, therefore, he does not use it. The latter author reported 94 cases where operations were performed for sterility. Gestation followed in 36 per cent.

Keene and Payne (O.S.Pa.) outlined in detail their method of investigating sterility. They include a careful history of both husband and wife, physical examination of both, the special gynecologic examination, tubal patency tests and laboratory investigations. Special emphasis is placed on the endocrine glands. Mayer and Hoffman elaborated further on the detection and treatment of the endocrine disturbances which result in sterility. Cary (O) also discussed the essentials of a diagnostic survey of sterility. Stein and Levinthal (A.M.A.) reported an analysis of 300 couples presenting sterility problems. After treatment, pregnancy occurred in 17.3 per cent.

Rubin (O) shows that appendicitis plays a distinct rôle in the etiology of female sterility and he advocates appendectomy for even slight attacks of appendicitis in young women.

Reist (S.G.S.) discussed the tubal patency test as an aid in the diagnosis of sterility due to tubal closure. Anderes preferred salpingography to the Rubin test in most cases but Frey did not. The latter agreed with Reist that in all cases a bacteriologic examination should be made before the patency of the tubes is tested. The patient should remain in a hospital for twenty-four hours after the test is performed.

Rubin (A.G.S.) reported the results of twelve years' experience with his uterotubal insufflation test. He observed no serious sequelae in the 3600 tests he performed. With the aid of the kymograph he can detect the presence of tubal patency, nonpatency, tubal stenosis, peritubal adhesions, and uterotubal spasm. In most instances it is possible to locate the site of obstruction. Rubin points out that tubal insufflation has a definite therapeutic value in sterility because it was the only treatment employed in 62 per cent of 398 cases where pregnancy followed its use. Improvement of dysmenorrhea was observed after insufflation in 66.6 per cent of 57 patients. N. F. Miller observed no complications in 400 of these tests but he prefers to inject opaque substances and control them under fluoroscopic examination. Heaney found the test useful when operating for fibroids in young women. If before the operation the tubes are found open, the patient may be told there is a possibility of a myomectomy being done. If, however, the tubes are closed, a myomectomy should not be done. Norris suggests using the Rubin test before employing intrauterine radium for benign hemorrhages when there is a question as to the condition of the tubes.

Rubin (N.Y.O.S.) demonstrated how the diagnosis of nonpalpable tubal adhesions and tubal stenosis can be made by uterotubal insufflation with the aid of the kymograph. The diagnosis is based upon the fact that tubal contractions in the presence of these lesions are completely absent or markedly changed. Cary emphasized the necessity for routine bimanual examination after insufflation because in some cases a distended tube may be felt.

v. Mikulicz-Radecki (N.E.G.G.S.) reported his experience with graphically recorded Rubin tests. He believes this procedure yields as much information as salpingography, it is cheaper and requires less time to perform. Benthin is not strongly in favor of tubal patency tests, whereas Fuchs finds the test valuable. Sturgis (O.S.Pa.) claims the injection of lipiodol is of direct therapeutic value in certain cases of sterility.

Schmitz (C.G.S.) found reports of 429 salpingostomies in the literature. The incidence of full-term pregnancies following these operations was 10 per cent. There were two pregnancies after Schmitz's 15 tubal transplantations and salpingostomies. Stein and Greenhill each reported two pregnancies after salpingostomy. Serdukoff (O) maintains that the incidence of favorable results after tubal implantation varies from 20 to 33 per cent.

Holden and Sovak (A.G.S.) reported an improved technic for reconstructing oviducts. They perform a circumcission operation for occlusions in the outer third of the tube and implantation for stenosis in the inner two-thirds. Watkins (O) also presented a new method for implantation of the tube into the uterus. Sovak (N.Y.A.M.) devised a syringe which is especially adapted for intrapelvic tubal insufflation.

Reiprich (G.G.S.) discussed the operative treatment of tubal sterility and also the results of his animal experiments. In rabbits he performed auto- and homiotransplants of fallopian tubes and in addition he transplanted an entire uterus from one animal to another. His experiments proved that transplants of the whole uterus can function successfully.

ENDOCRINOLOGY

It is impossible in this review to take up more than a few discussions especially because the more one reads of the experimental work in this field the more confused one becomes. It is to be hoped that during the next few years this subject will be clarified particularly because at the present time, physicians are using endocrine products in a most haphazard fashion.

At the last German Gynecological Congress important papers were read by Zondek, Aschheim, and Guggisberg. According to Zondek, the anterior lobe produces three and perhaps four hormones, one of which controls growth, another ripening of follicles, the third luteinization and the fourth metabolism. These hormones are not specific for they are identical in human beings and animals, and they are produced throughout the entire life of the individual. The same amount is found in the human male and female hypophysis. Zondek also took up the biologic activity of these hormones, their diagnostic significance and their clinical application. Aschheim discussed the importance of the anterior lobe in obstetrics and gynecology. He collected from the literature reports of 4000 cases where the Aschheim-Zondek test for pregnancy was used and it proved to be correct in more than 98 per cent. He admits it has not yet been decided as to whether the hormone in question arises in the hypophysis or in the placenta. Guggisberg considered the posterior lobe of the pituitary. He pointed out the strong excitor effect on the uterus and other smooth muscle, its antidiuretic effect and its influence on pigment cells. He maintained that in lactating animals injections of posterior pituitary increased the secretion of milk. The significance of this hormone for the induction of labor requires elucidation because animals in which the hypophysis has been removed have normal labors.

At the A. G. S. meeting Zondek again took up the relationship of the anterior pituitary to genital function. He expressed the opinion that a definite answer concerning the chemical identity of the anterior lobe hormone and that obtained from the urine will not be forthcoming until both substances will be available in pure form. Likewise chemical analysis will solve the question as to whether prolan is a single hormone or a mixture of two. Zondek reviewed his evidence which tended to prove that the anterior pituitary activates the ovaries for sexual function. He also discussed a new procedure known as "Hormonal Tissue Diagnosis." He found that in the presence of benign genital tumors in women there is an increase of prolan A elimination in the urine in about 20 per cent of the cases; it rises to 36 per cent in cases of extragenital carcinomas and to 80 per cent in cases of malignant genital neoplasms. In the discussion Frank maintained the belief that there is only one hormone which is responsible for both follicle growth and luteinization. He also said he tried to duplicate Zondek's work on tumors but his results were disappointing.

Loeser (B.G.O.S.) found anterior lobe hormone in the skin of pregnant women but he could not find follicle hormone. Therefore, a skin test may be devised some day which will dispense with the Aschheim-Zondek animal test. Thus far attempts to devise such a test have failed. This paper was discussed by Zondek, Aschheim, and Philipp. The last named found much more hormone in the chorion of early pregnancies than in the same amount of full-term placental tissue. He emphatically stated after a study of 35 pituitary glands taken from pregnant women that this gland in pregnancy contains no hormone. Hence the placenta is the source of the hormone.

Dodds (R.S.M.) made a statement with which all gynecologists will agree, namely that the developments in sex hormone research have been so rapid that it is impossible for any one person to be fully up to date. He reviewed the recent research in this field and Parkes took up the standardization of extracts of the sex glands. The latter pointed out that it would be necessary to give a woman 500,000 mouse units to produce any estrus effect and that at the present time this is financially impossible. A number of men discussed this paper and Bonney expressed the hope that Dodd's paper would act as a corrective to the credulous optimism which resulted in the production of worthless papers and worthless therapy.

At the first Congress of the French Gynecological Society, Jayle reviewed the anatomical and clinical relationships between the hypophysis and the ovaries but nothing new was presented. Hallion (F.G.S.) then elucidated the physiologic connections between these two glands of internal secretion as based upon experimental facts and likewise added nothing original. In the discussion Aron said he did not believe the pituitary elaborates two hormones. He maintains there is only one hormone which produces both maturation and luteinization depend-

ing upon the amount present. Furthermore it has not been proved that the hormone in the urine of pregnant women arises in the hypophysis. There is more evidence to point to its origin in the placenta. Laroche and Simonnet reported good results in 75 out of 100 cases where they used anterior pituitary hormone clinically for regulation of the menses. Seven papers on endocrinologic subjects were read before the Kinki Gynecological Society (Japan) but nothing new was presented.

Experimentally, Fluhmann (A.G.S.) proved that when the rabbit's uterus undergoes the changes brought about by the ovarian hormones estrin and progestin, it acquires the power of responding much more actively with macrophages to traumatic stimuli. He suggested that attention be directed to the possible use of sex hormones in the treatment of pelvic inflammatory disease.

Miklos (G.S.H.M.S.) maintains that the corpus luteum produces at least two hormones, one of which produces the pregravid change in the endometrium and the other regulates the duration of pregnancy.

Based upon a brilliant series of experiments Dorn and Sugarman (O) found that by injecting rabbits fully three months old whose testicles were in the inguinal canal, with urine from pregnant women in between five and ten months of pregnancy, they were able to prognosticate the sex of the unborn child in 89 out of 85 cases.

Anspach and Hoffman (O.S.Pa.) started an endocrine clinic for the study of amenorrhea, uterine bleeding, and sterility. They found that the picture presented by the endometrium proved the most important single observation in estimating ovarian function, that thyroid products are one of the most reliable preparations at our command and that the roentgen ray when judiciously applied, seems to be an important therapeutic agent in combating endocrine dysfunction.

Gragert (N.W.G.G.S.) produced menstruation in five women who had oligohormonal secondary amenorrhea by means of anterior pituitary and sex hormones. On the other hand Kurzrok and Ratner (O) found that in their cases of amenorrhea accompanied by genital hypoplasia the excretion of follicular hormone in the urine was slightly greater than normal. Hence the administration of follicular hormone for therapeutic purposes could not and did not produce either a cure or improvement. Violet (F.C.G.) obtained good results in amenorrhea by small venesections. In the discussion, Pierra favored local venesection in the form of cupping scarified areas in the region of the ovaries for both amenorrhea and dysmenorrhea. Ford and Mueller (O) question the value of the Frank test for the determination of the concentration of the estrus-producing hormone in the circulating blood.

A review of the literature and an analysis of the answers received to 1000 questionnaires convinced Sellers (S.M.A.) that the cause of dysmenorrhea is still unsettled and that the best results are obtained by prolonged dilatation of the cervix.

Novak (O.S.Pa.) is of the belief that primary dysmenorrhea is due to a heightened irritability of the uterine muscle which occurs usually a day or two before the onset of menstrual bleeding, when the withdrawal of the inhibiting corpus luteum hormone takes place. He, therefore, advocates as part of the treatment the use of the so-called luteinizing substance prepared from the urine of pregnant women. This form of therapy is based upon the physiologic studies made by Novak and Reynolds (A.M.A.) in which it was shown that female sex hormone or theelin is an excitant and progestin an inhibitor of uterine motility.

Koller (S.G.S.) in discussing genital hemorrhages in young girls advocated the routine analysis of the blood and urine to find a basis for hormone therapy which, however, up to the present time has been disappointing. He emphasizes that in the final analysis patience accomplishes more than manipulation. Exchaquet (S.G.S.) reviewed the literature on the matter of the metrorrhagias at puberty and admits that the literature on this subject is very confusing. Eight men discussed the latter two papers but added nothing.

Keene (I.M.S.) discussed the diagnosis and treatment of functional bleeding. In these cases Geist and Glassman (O) found that neither from the type of bleeding, the duration of the symptoms nor the histologic data can a definite prognosis be made. All cases (except the puberty cases) should be curetted and observed and if necessary recuretted before more drastic steps are taken. Novak (S.M.A.) has recently obtained encouraging results in treating functional uterine bleeding by means of an anterior luteinizing substance obtained from the urine of pregnant women. The idea back of this treatment was to activate luteinization in the ovary and, as lack of lutein tissue is the chief ovarian factor

in this disorder, this treatment appears rational. However, the effect of the therapy appears to be temporary.

C. J. Miller (A.C.S.) presented a thorough discussion of the modern conception and treatment of uterine bleeding. Frank (A.G.S.) mentioned the success obtained with the injection of venom of the moceasin snake in cases of uterine hemorrhage in which the usual forms of therapy had failed.

Kantor and Klawans (C.A.O.G.) found that 68.4 per cent of the women in their series who had postmenopausal bleeding had a malignancy. Therefore the axiom, "All cases of postmenopausal bleeding should be considered as malignant until proved otherwise," is significant.

Geist and Spielman (O) used theelin and amniotin to relieve the symptoms of the menopause. They found that substitution of the female sex hormone alone does not in all cases relieve the menopausal syndrome. Amniotin was superior to the other therapeutic agents used by the authors.

Hofbauer (O) warns that the prolonged use of hypophyseal preparations may lead to harm especially in women with diminished ovarian function. He found this to be definitely true in experimental animals.

(Discussions on the hormone tests of early pregnancy have been omitted because their value is universally conceded and nothing new about them has been added during the past year.)

LATE TOXEMIAS OF PREGNANCY

In experiments on animals Titus, Messer, and McClellan (A.G.S.) attempted to imitate an eclamptic process by administering sublethal doses of guanidine. The animals showed progressive lethargy then paralysis and finally convulsions followed by death. Suggestive changes in the liver were found. On the other hand, Stander (O) maintains that the blood guanidine is not markedly elevated in eclampsia and that intravenous administration of this substance in the rabbit does not produce liver necrosis. Calcium therapy in eclampsia does not appear rational on the basis of blood guanidine, blood sugar or blood cation ratios.

Toombs (A.A.O.G. & A.S.) was convinced that in the theory of focal infection as a factor in pregnancy toxemia, we have a more rational basis upon which to work out an effective therapy than any which has heretofore been brought to our attention. LaVake agreed with Toombs whereas Titus and J. E. Davis disagreed.

As the result of animal experimentation Bartholomew and Kracke (A.G.S.) are of the opinion that autolysis of placental infarcts is the cause of eclamptic toxemias and that eclampsia and abruptio placentae probably differ only in the location of the infarcts. Neither Morse nor Fraser agreed with these authors, but Kerr (E.O.S.) believes that the onset of toxemia is probably due to the products of protein autolysis, degenerated villi, and placental infarcts.

Wirz (M.R.O.G.S.) studied the connection between atmospheric disturbances and eclampsia but found no direct influence. Harding and Van Wyck (N.Y.O.S.) maintain that the edema theory of Zangemeister offers the most unifying view of the toxemias of later pregnancy. However, it requires modification to allow for the formation of edema in individual organs and for the possibility of internal changes in water distribution. These authors have demonstrated that hypertonic saline solution exaggerates the symptoms of the toxemias of pregnancy.

Janney and Walker (A.M.A.) discussed the conjunction of intercurrent disease with lowered functional capacity of the kidney in the latter weeks of pregnancy as a precipitating factor in toxemic states. Rowe (A.M.A.) found evidences of disturbed function of the liver in many women who had toxemia but not in all.

According to Stander, Ashton and Cadden (O), of the Mosenthal, phenol-sulphonethalein, diastase, thiosulphate, urea concentration factor, urea clearance, guanidine, and creatinine excretion tests only the latter three proved of real value in the differentiation between mild nephritis and the other toxemias of pregnancy. These authors recommend the urea clearance and creatinine excretion tests as a routine in all cases of toxemia where the diagnosis is not clear. On the other hand, MacKenzie (O) insists that the routine chemistry of the blood and urine is of little value in differentiating the hepatic and the nephritic toxemias of pregnancy. However, he maintains that urobilinuria is usually not present to a pathologic degree in nephritic toxemia but it is generally found in the hepatic types.

In the treatment of eclampsia Gerrard and Newton (N.E.O.G.S.) preferred conservatism in the form of a combination of the Stroganoff and Dublin methods. Their best results were obtained with a combination of morphine, camphor preparations, magnesium-sulphate, glucose, gastric lavage, colonic lavage, and chloral hydrate. Eight individuals discussed this paper and apparently favored conservative therapy. Upshaw (A.M.A.) secured the best results in his series of eclamptic patients by means of morphine, magnesium sulphate, and intravenous glucose. King, Lewis, Schreier, and Plass also spoke in favor of conservative treatment. Arnold and Fay (O) prevent and control eclampsia by means of fluid limitation and dehydration.

Vogt (S.E.G.S.O.G.) advocated the use of pernocton in the treatment of eclampsia. Four discussants agreed that this drug was helpful but one expressed the fear that it led to severe kidney damage. Bohler (O) and Schwanen (O) likewise favored pernocton in the treatment of eclampsia. Hamblen and Hamblin (O) controlled eclamptic convulsions by means of sodium amylal in all their cases and King, Mayer, and Ayo (O) and also Watt (O) obtained the same results. Schey (G.S.R.H.M.S.) suggested the use of thymophysin to hasten labor in cases of eclampsia.

Peckham (N.Y.O.S.) previously showed that 22 per cent of women with eclampsia will be found to have signs of chronic nephritis several months after delivery. Excluding this condition as well as hyperemesis, he found that 40 per cent of the remaining toxemic women likewise show signs of renal involvement during the puerperium or later. He collected 32 cases where nephritis after delivery was probably due directly to a toxemic condition which developed during pregnancy. He emphasizes that the custom of classifying a given toxemia by the blood pressure and urine findings during pregnancy or even at the time of discharge from the hospital is fallacious. Bunzel found that if women who had toxemia subsequently became pregnant they had a 69 per cent chance of a recurrence and only a 60 per cent chance of having a live child. Rucker (A.A.O.G. & A.S.) found recurrences of toxemia in from 16 to 27 per cent of his cases. Young, Sym, and Crow (R.S.M.) followed up 239 cases of eclampsia and albuminuria and found that 20 per cent suffered from grave impairment of health and in 2.1 per cent death had occurred subsequently. They observed that the degree of disability was greatest in those women who were exposed to the toxemia the longest time. Browne, Fairbairn, and Wyatt agreed that there were serious effects after toxemia of pregnancy, but Rivett said that in his experience patients who had eclampsia did not develop toxemia in a subsequent gestation. McIlroy likewise denied that toxemia was likely to recur. In her opinion bacillus coli had something to do with the toxemias of pregnancy and she believed the state of the teeth was a causal factor. Another investigator of this subject was Schultz (N.W.G.G.S.), who examined 92 women after they had had eclampsia. He failed to find serious kidney damage in a single one.

In the opinion of Anselmino, Hoffmann, and Kennedy (O) nephropathy in pregnant women and eclampsia is due to disturbances in the glands of internal secretion. The substance which is mostly responsible for these disturbances is an uncompensated overproduction of the antidiuretic component of the posterior lobe of the pituitary gland.

LABOR

At the last meeting of the German Gynecological Congress important papers on the care of pregnant women were read by Hirsch and by Sellheim. The former began with the care of young girls in childhood and carried this theme through puberty, adulthood, pregnancy, labor, and the puerperium. He emphasized that those responsible for the welfare of women are physicians, midwives (in Germany and other European countries), nurses, and social organizations. Sellheim's subject was "Careful Delivery" and he outlined a method of managing labor which is safe for both mother and child. He emphasized that we have the means of easing the difficulties of labor which are the result of the present-day manners of living. Beck (A.M.A.) is firmly convinced that normal labor should be allowed to proceed along physiologic lines and that nothing should be done to interfere with the natural mechanism. The routine of labor he describes has given very satisfactory results. Bland (A.M.A.) discussed the prevention of maternal injury which may be associated with pregnancy and labor, and Litzenberg (A.M.A.) took up the matter of preventable

invalidism following childbirth. The latter was most emphatic in presenting evidence to show that the ultimate welfare of the parturient woman cannot be secured by good antepartum and intrapartum care alone but requires equally good postpartum attention. Bingham (A.M.N.N.J.) claimed that by means of diet and exercise the following complications may be reduced: toxemia, abruptio placentae, difficult forceps deliveries, lacerations, cesarean section, subinvolution, postpartum hemorrhage and shock, infections, premature labor, and stillbirths.

Frey (U.R.O.G.S.) advocates counting the number of uterine pains after rupture of the bag of waters. He showed the value of such charts in deciding upon the prognosis and the method of delivery. He again (G.S.G.S.) discussed this matter as it pertains to the conduct of labor in cases of contracted pelvis.

Solomons (R.S.M.) reviewed the differences in the methods of obstetric diagnosis and treatment at the Rotunda Hospital in 1909 and 1929. He found a marked increase in the cases of disproportion and of abruptio placentae. He now prefers the cervical to the classic cesarean section and is a convert to the method of inducing premature labor by puncture of the membranes. Slemons (L.A.O.S.) also is strongly in favor of inducing labor at term by rupturing the bag of waters. He describes the method which has given him excellent results in 132 cases. Dallera (P.M.S.S.) ruptured the membranes artificially in 87 cases and found that labor was considerably shortened in these cases. He is now of the opinion that the bag of waters is not absolutely necessary for dilatation of the cervix. Kreis (S.G.S.) obtained short labors by systematically rupturing the bag of waters in all head and breech presentations regardless of the amount of dilatation, provided labor had begun. An additional aid was the use of antispasmodics in all cases of uterine spasm during the first stage of labor. He maintained that the evil effects of spontaneous premature rupture of the membranes are due to spasm of the uterus. Guggisberg (S.G.S.) also presented a paper on the medical conduct of labor and favored the combination of thymophysin and narcotics.

Willi (G.S.G.S.) obtained good results by using thymophysin in 200 cases during the first stage of labor. Frey preferred the use of twilight sleep to hastening labor and expressed the opinion that thymophysin and pituitary extract were qualitatively identical. Greenhill (C.G.S.) agrees with this statement. He and Paddock (S.M.A.) see no more indication for the use of thymus and pituitary extract in normal labor than there is for ordinary pituitary preparations. Neither can Roques and MacLeod (O) recommend thymophysin. On the other hand, Temesvary (O) and Laubscher (O) strongly advocate the use of this drug.

Gheorghiv (B.S.G.O.) suggested the routine revision of the uterine cavity after labor as a prophylactic measure against infection and claimed that in 30,000 to 40,000 cases the morbidity was only between 3 and 4 per cent. Most of those who participated in the discussion of this paper opposed the method as a routine.

Danforth (C.G.S.) took up the treatment of occiput posterior and described the method of manual rotation which has yielded excellent results in these cases. Holmes concurred with Danforth in condemning instrumental rotation. Scott (C.A.O.G.) analyzed a series of 144 cases of occiput posterior in 51 of which the occiput had to be rotated. This was accomplished manually in all but one case.

In a discussion on the difficulties and dangers of forceps delivery, Plass (A.M.A.) gave excellent advice on how to minimize the risks involved. An analysis of 535 cases of mid and high forceps revealed to Acken (B.G.S.) that the maternal mortality was only one-tenth that due to cesarean sections. Piper (A.G.S.) described a new axis traction forceps which Caldwell maintained simplifies forceps operations but he cautioned that it must be used with great care and skill. DeLee and Vaux condemned the forceps as dangerous.

In taking up the subject of breech presentations Glassman (N.Y.A.M.) favored external version. Likewise Studdiford (A.M.A.) recommends external version between the thirty-second and thirty-eighth weeks of gestation. During labor he advocates a policy of watchful waiting for the average operator rather than extraction at the beginning of the second stage. In the 170 cases of breech presentation analyzed by Mohler (O.S.Pa.) there was a gross mortality of 35.2 per cent but only 13 babies were lost from some accident of delivery. Schwarz (S.M.A.) is convinced that the poor results obtained in breech delivery are due chiefly to traumatization and secondly to asphyxia. He describes his technic.

Baer, Ries and Lutz (A.G.S.) maintain that the well-recognized dangers inherent in delivery by high forceps justify a marked diminution in the frequency of this type of delivery. They also prove that the margin of safety for the parturient following version and extraction is much greater than that offered by cesarean section. Potter (M.M.S.) again describes his technic of performing elective version.

Naguib Bey (B.M.A.) reported the unusual experience of having observed 110 cases of rupture of the uterus all of which were due to neglect and inexperienced interference in cases of obstructed labor. Only one of the cases represented rupture of a cesarean section scar. The mortality of laparotomy was 55 per cent and of expectant treatment excluding moribund cases, it was 56 per cent. Stevens advocated "shockless anesthesia" for cases of rupture of the uterus by the injection of morphine and infiltration of the abdominal wall with novocaine.

CESAREAN SECTION

In a discussion on cesarean section Wodon (B.S.G.S.) described the various types of the operation. He prefers the cervical operation and makes a transverse incision in the lower uterine segment in clean cases and a vertical incision in infected cases. Rocmans (B.S.G.O.) maintains that the mortality for clean cases is about the same for the corporeal and cervical cesarean sections. In impure cases it is decidedly greater in the corporeal type. He favors the cervical operation because there is less danger of infection, shock or hemorrhage than in the classic operation. Coeq (B.S.G.O.) reserves the high operation for clean cases and the low one for patients who have had a test of labor. The latter two papers were discussed by four individuals, two of whom use only the low operation, one employs the high operation exclusively and the fourth performs the classic operation only when speed is essential.

Mansfeld (R.H.M.S.) prefers the technic of Doerfler in which after the uterus is brought up outside of the wound a transverse incision is made in the lower uterine segment but the bladder is not stripped down. Richter (D.G.S.) gave up the classic operation in 1921 and has been performing the cervical operation routinely since then. He urges however, that the incision in the abdominal wall and in the lower uterine segment be made sufficiently large to permit delivery of the child by extracting the feet first. In discussing this paper Fischer recommended the Portes operation for infected cases. Peters prefers the classic operation and in order to render the field of operation bloodless, he injects pituitary extract into the proposed line of incision in the uterus. Albert agrees with Peters but Prüssmann prefers the cervical operation.

Skeel and Jordan (A.A.O.G. & A.S.) reviewed 1,047 cesarean sections which were performed in the Cleveland registration area. Their analysis showed that the low operation has a definitely lower mortality rate than the classical. They recommend the former operation for all potentially infected cases but advise that the Porro operation be done in the presence of definite sepsis. Cesarean section is not good treatment for eclampsia because the mortality is unjustifiably high. Phaneuf performs the cervical operation almost exclusively but he now prefers the transverse incision. Mathieu reviewed the results for the city of Portland, Oregon, McCord those for Atlanta and Jackson the cases in his private practice.

Shumann (N.Y.A.M.) discussed the elective cesarean section as a prophylactic measure against obstetric mortality and morbidity. He prefers the classic operation for these cases because the cervical one is more difficult to perform, it requires more time, extraction of the child is difficult because of the lack of distention of the lower uterine segment, the additional protection afforded by it against peritonitis is unnecessary and lastly it does not lend itself to local anesthesia as readily as the high operation.

In discussing the contraindications to cesarean section, Cook (A.M.A.) points out that most fatal cesarean sections are performed in the presence of contraindications. The universally recognized contraindications are actual or potential infection in the genital tract, lack of valid indication for the operation and the convulsive stage of eclampsia. This author points out that even in unskilled hands the procedures alternative to cesarean section carry a total maternal mortality risk from shock, hemorrhage and infection less than that of cesarean section performed in the presence of contraindications.

Analyses of statistics on cesarean section were presented by Adams (O) for the city of Portland (217 cases), by Seeley (D.O.G.S.) for Detroit (203 cases) and by Courtiss and Fisher (O) for the Robinson Memorial Hospital in Boston (1,000 cases).

ENDOMETRIOSIS

As in previous years Sampson and Novak aired their differences concerning the etiology of endometriosis before the A.G.S. For this year's talk Sampson chose the subject "Pelvic Endometriosis and Tubal Fimbriae," while Novak spoke on "The Morphology of the Genital Epithelia With Special Reference to Differentiation Anomalies." As the years go by, there appears to be less and less divergence in the viewpoints of these two authorities and as Novak said, "It seems possible that before many years have passed Dr. Sampson and I might well be able to present a joint paper on the etiology of endometriosis." A number of years ago Novak conceded that Sampson's implantation theory explained some cases of endometriosis and now Sampson's study shows that at least a certain proportion of cases of ovarian endometriosis are due to direct metaplasia of tubal mucosa into endometrium with subsequent invasion of the ovary. This agrees with Novak's own observations which indicate further that the germinal epithelium itself is capable of such metaplastic transformation into either a tubal or uterine type of epithelium.

A lively discussion followed Sampson's and Novak's papers in which Taussig summarized the present facts concerning endometriosis most satisfactorily about as follows: The tubes are always open, there is evidence of menstrual blood passing out through the tubes, and evidence of a peculiar distribution in the culdesac of tissue that can only be explained as implants. There is definite evidence of the development of various forms of tubal, uterine and even squamous epithelium from the celomic epithelium and there is evidence of traumatic metaplasia at certain points, as at tubal stumps and at the fimbriated ends of the tubes. With these facts in mind we cannot accept just one theory. First, we must agree there occurs metaplasia in various portions of the genital tract without apparent cause. Second, there is definite evidence of implantation both in wounds and in the rupture of endometrial cysts pointing toward the implantation theory. Third, there is the possibility of a certain activating substance passing from the tubal lumen out over the surface of the pelvic organs and giving rise to the development of islands of metaplasia. Taussig believes this latter explanation may be more frequent than we have hitherto thought.

Culbertson mentioned methods of differentiating the epithelial cells of the uterine glands from tubal epithelium. He pointed out that the former are not granular during the ciliated phase or at least the cytoplasm has very few granules whereas the tubular cells have abundant granules. However, the chief difference is that the uterine epithelial cell produces an abundance of glycogen whereas the tubular epithelium does not.

In a discussion before the M.R.O.G.S. Heim took up the development of endometriosis. He maintained that Sampson's theory is incorrect and that the serosal epithelium theory was corroborated by his clinical and anatomical studies. He found that mesothelium, germinal epithelium and endothelium and their genetically associated mesenchyma in the region of the cloaca may become transformed into müllerian tissue.

Allen (C.A.O.G.) found that metaplasia of uterine epithelium may be produced by transplantation into the anterior chamber of the eye in rabbits and also that the uterine epithelium in these animals possesses more marked proliferative and heteroplastic tendencies than the epithelium of the peritoneum.

Before the U.R.O.G.S., Seitz, another authority on endometriosis, discussed the clinical symptomatology of endometriosis with special reference to the significance of the irregularities in the menstrual cycle. He emphasized that the most important and frequent symptom was dysmenorrhea, of which there are two types, (1) premenstrual and early menstrual which occurs chiefly with internal endometriosis and (2) late and postmenstrual which is associated chiefly with external endometriosis. In both types of endometriosis, profuse and prolonged bleeding is common. Chocolate cysts and heterotopic growths may easily be damaged during the menstrual period. In another lengthy article Seitz (O) takes up the etiology, symptomatology and treatment of endometriosis. He uses the term "heteropia of the uterine mucosa" as a synonym for the condition. In the treatment of endometriosis he recommends operation for some cases and radiotherapy for others. He is of the opinion that women who have endometriosis

must be followed up as if they had carcinoma and no opinion as to cure should be ventured until five years have elapsed after treatment. Another excellent and exhaustive article on this subject is the one by Frankl (O) based upon a pathologic and clinical study of 94 cases.

GONORRHEA

Marcel (F.C.G.) presented the following conclusions of the French Commission appointed to study criteria for the cure of gonorrhea. (1) No diagnosis can be made without a bacteriologic examination. Slides should be stained with methylene blue and with Gram's stain and gonococci should be diagnosed only if the organisms are found in groups and intracellularly. (2) The diagnosis of a cure rests upon clinical, bacteriologic and where possible serologic evidence. The clinical facts depend upon the history, therapy and complications. The bacteriologic tests should be made after the cessation of all treatment, after attempts at reactivation with beer, silver nitrate, and diathermy and above all following the menses. These examinations must be repeated for a few consecutive months. Serologic tests are technically difficult. Harrison (R.S.M.) likewise laid great emphasis on supplementing the clinical examination of gonorrhea by bacteriologic tests and especially by the complement fixation test which he considers most useful. His favorite antiseptic is mercurochrome but he also advocates vaccines to raise the resistance of the body. In the discussion Abrahams mentioned that it is more difficult to detect the gonococcus in pregnant than in nonpregnant individuals. His criteria for a cure are more stringent than those laid down by the French committee. He does not consider the complement fixation test reliable. Davies criticized local treatment of the urethra and cervix without treating the body of the uterus which in his opinion is very often infected. His experience with diathermy was most unsatisfactory and he was not impressed with vaccines. He considers glycerin the best bacteriocidal substance. Eight others discussed this paper and gave varied opinions concerning the treatment of gonorrhea.

Jacoby (O) pointed out the unreliability of laboratory aids in the diagnosis of gonorrhea in women. He believes that the Gram stain is not essential because the methylene blue stain in conjunction with the clinical examination is adequate for practical purposes. A negative smear even when repeated does not exclude a gonorrheal infection and neither does a negative culture. The complement fixation test is unreliable. Jacoby, therefore, maintains that greater reliance upon the history and clinical evidence will suggest the correct diagnosis in many of the now unrecognized cases of gonorrhea in women.

Royston and Roblee (St.L.G.S.) presented a detailed clinical analysis of 100 cases that received medical heat treatments for subsidiary, subacute and chronic adnexitis and cellulitis including 40 cases of coincident cervicitis treated by surgical heat. Warren and Wilson (A.G.S.) recommend artificial (general) hyperthermia for gonococcal infection. A temperature of 41.5°C (106.7°F.) is maintained in a cabinet for several hours. In the discussion Fluhmann called attention to the use of hot baths (105°F.) for the purpose of producing hyperthermia.

Huggins (A.A.O.G. & A.S.) maintains that there is no greater danger in the removal of gonorrheal tubes within the first twenty-four hours of the onset of the infection than in the operation for an acutely infected appendix. He believes also that in a case where previous attacks have occurred and where the patient has not been free from symptoms between attacks it is much better to operate at once. Babcock agreed with Huggins but Schmitz, Barrett, J. E. Davis and Cooke opposed operation in acute cases of gonorrheal infection.

Ferroni (T.O.G.S.) advocates simple opening of the abdominal cavity in cases of adnexal suppuration (nontuberculous) because in twelve cases where he did this, ten were cured and two were improved after the exploratory laparotomy.

Baldwin (A.A.O.G. & A.S.) advises surgical intervention in cases where there is reason to believe the function of the tubes is lost and their further retention will be a source of discomfort.

In a series of 73 women who had gonorrheal infection of the tubes and who were followed up, Habbe (N.W.G.G.S.) found that 14 or 19.1 per cent became pregnant after conservative treatment. There was only one ectopic gestation in this series. In a series of 26 cases where apparently healthy tubes were left in place when a diseased one was removed from the opposite side, Rupp (O) found that 19 subsequently became pregnant one or more times.

Curtis (A.M.A.) points out that adhesions of the anterior surface of the liver are not infrequent complications of gonorrheal disease of the tubes and that

these adhesions apparently develop during the acute stage of the pelvic infection.

According to Nelson (N.M.S.M.) epidemiologically, gonorrheal vulvovaginitis is sufficiently prevalent to make the problem worthy of consideration. In 1930, 11.8 per cent of all females in Massachusetts who had gonorrhea were under fourteen years of age. Paine (N.M.S.M.) treats vulvovaginitis regardless of whether or not it is gonorrheal in origin by means of soap and water cleanliness and the external use of boracic acid powder. He believes that active treatment with douches, irrigations and application of antiseptic preparations prolongs the inflammatory reaction.

CARCINOMA

The centenary meeting of the Section of Obstetrics and Gynecology of the British Medical Association was in reality an international congress. Among the subjects discussed was the treatment of carcinoma of the uterus. The opening paper was presented by Lacassagne who reviewed the statistics of the Radium Institute of Paris. This author expressed the commonly accepted viewpoint that carcinoma of the body of the uterus and sarcoma should be treated by surgery but epithelioma of the cervix is more suitably treated by radiotherapy. The incidence of cures obtained with radium in the author's clinic increased as the technic improved. The 4 gm. bomb in use is helpful but the Institute expects to secure an 8 gm. bomb and by means of it may cure more patients. The immediate mortality was less than 2 per cent and most of the fatalities were due to infection. Voltz presented the results obtained at the Radiological Institute in Munich. He favors routine irradiation of the pituitary gland (as suggested by Hofbauer) in addition to the local application of radium because this not only increases the sensitiveness of the carcinomatous tissue to the action of radium but also improves the general condition of the patient. Bonney of London is a firm believer in the efficacy of the Wertheim operation for carcinoma of the cervix and he reviewed the results obtained in his extensive experience. He has reduced his operative mortality from 20 per cent in his first 100 cases to 9 per cent in the last 128 cases. He maintained that five years of freedom from recurrence is only a 90 per cent cure because in his experience 10 per cent of all recurrences manifest themselves between the fifth and tenth years after operation. G. G. Ward of New York believes the best statistical reports show that radiotherapy is preferable in all cases of carcinoma of the cervix, although the radical operation would give as good results in the early cases but at a high cost of primary mortality and morbidity. He emphasized that reirradiations when properly employed are of definite value in curing local metastases throughout the five-year period of observation. Carcinoma of the fundus is best treated by the combined use of radium and surgery whenever possible. Furthermore, if radium is used, experience and a thorough understanding of the action and application of this powerful agent are essential. Strachan of Cardiff said that in his experience little help was gained from a study of the various grades and types of cells composing the tumor as a guide to radiosensitivity. Maliphant is of the opinion that deep x-ray therapy is necessary in all cases because radium alone is not sufficient to deal with extracervical extensions. In the discussion Berkeley was the only one who agreed with Bonney that the Wertheim operation was the treatment of choice in carcinoma of the cervix.

Faure (F.A.M.) is a firm advocate of early operation for cervical carcinoma and claims that his incidence of cure for these cases was 90.9 per cent. Regaud, director of the Institute du Radium, refuted Faure's statements at the following meeting of the Academy and pointed out that even in the better cases radiotherapeutic methods give results superior to those obtained with the Wertheim operation.

Martindale (R.S.M.) maintained that modern technic in the treatment of carcinoma of the cervix and of the body includes deep x-ray therapy either by the one treatment method, or the fractional method. Simon (V.O.G.S.) reviewed the literature and found that the best results in the treatment of cervical carcinoma were obtained by a combination of radium and x-ray therapy. Before the same Society, Schloss and Maier reported their technic of the treatment of uterine carcinoma with radium.

Jayle (F.G.S.) read a paper on "Abdominal Hysterectomy for Cancer of the Uterus" and at the conclusion he presented the following resolution which was accepted by the French Gynecological Society: (1) The term Wertheim operation is no longer to be used in the Society; (2) Operations should be listed as (a) abdominal hysterectomy with or without salpingo-oophorectomy, (b) enlarged hysterectomy with or without adenectomy and, (3) The glands removed must be

specified. Jayle presented this resolution because the operation which bears the name of Wertheim was the result of the contributions of Freund, Ries, Clark and Kelly. At the same meeting Pouliot described Schiller's lugol test for carcinoma of the cervix and said he found the test to be very helpful.

Schmitz (C.A.O.G.) discussed the relationship between the development of the growth and the symptoms of carcinoma of the cervix. He took up the macroscopic findings, the microscopic characteristics, the extent of the tumor, the symptomatology and the correlation of the histologic and clinical signs. At the end of this interesting discourse Schmitz took up methods of preventing carcinoma of the cervix. At the same meeting Newell (C.A.O.G.) presented the five-year end-results in the treatment of carcinoma of the cervix at the Barnes Hospital. Of the 121 cases reported, only 3 patients were operated upon. The rest were treated with radium and x-ray. Keene and Kimbrough (O.S.Pa.) reported that the salvage in their cases of carcinoma of the cervix treated with radium was 18.3 per cent for both early and late cases.

The treatment of carcinoma of the cervix by vaginal hysterectomy and radium is favored by Adler (A.A.O.G. & A.S.) who described his technic and presented his results in 1,000 cases. Jones (A.M.A.) reported a series of 420 cases treated by radium, and he took up the complications of this form of therapy. In the discussion of this paper, Healy and J. E. Davis emphasized the prophylaxis of cancer of the cervix. Crossen (C.C.St.L.C.) dealt with some pertinent facts concerning the treatment of cervical carcinoma. He is strongly in favor of giving the maximum of radiation at the onset of treatment.

The analysis of Auer (O) of the cases observed on the services of Gellhorn and Taussig showed that after the use of radium the incidence of patients who survived a five-year period rose from 4.76 to 11.67 per cent. However, in the early cases of carcinoma of the cervix, Auer believes radical surgery offers the greater hope of cure. For the intractable pain associated with the inoperable cases of carcinoma of the pelvic organs Grant (A.G.S.) recommended cordotomy. In the discussion Keene expressed the belief that this operation merits a greater trial, and R. S. Smith reported satisfactory results in 50 out of 65 cordotomies.

Philipp (B.G.O.S. and G.R.S.) presented a large number of roentgen ray plates to show that bone metastases in cases of uterine carcinoma are not uncommonly present. The bones involved are ilium, spine, pubis, and humerus. Most of these metastases were due to erosion by the primary tumor or involved glands. Hematogenous bone metastases are rare.

In some instances at least, leucoplakia of the cervix is a forerunner of carcinoma. Ries (C.G.S.) discussed erosion of the cervix, leucoplakia, and the colposcope in relation to carcinoma of the cervix. He described Hinselman's colposcope and pointed out its great value in detecting leucoplakia and early carcinoma. He advised that women have periodic colposcopic examinations. In the discussion Lifvendahl presented a simplified instrument. Kretschmer (O) also discussed leucoplakia of the uterine cervix as did Martzloff (P.S.O.G.). Whereas Ries and Kretschmer consider leucoplakia of sinister importance because of its connection with the growth of carcinoma, Martzloff does not believe that the evidence available is conclusive. He believes, however, that Hinselmann's work is of surpassing importance for cancer prophylaxis. Macfarlane and Howe (O.S. Pa.) maintain that the chief means available to prevent cancer of the uterus are periodic examinations and immediate cervical repair after delivery. Prevention of cancer of the cervix is largely the obstetrician's opportunity. Bland agreed with this statement. McGlenn and Foulkrod are convinced that cauterization of the cervix is better than repair or amputation.

Taylor (N.Y.O.S.) presented evidence to show that endometrial hyperplasia is a precancerous lesion in some cases. Hence in older women with hyperplasia an adequate dose of radium is particularly indicated not only to control bleeding but also as a prophylactic measure against the development of cancer.

RADIOLOGY

Before the A.G.S., Dannreuther spoke on intrauterine radium therapy as a conservative method of treatment in selected cases of fibromyoma, fibrosis uteri, endometrial hyperplasia, "precancerous" endocervicitis and tuberculosis of the endometrium after bilateral salpingectomy. He found that the menstrual function will be preserved in 78 per cent of cases when the dose is 750 mg. hours or less and the climacteric symptoms are no more pronounced after induction by radium than when the menopause occurs naturally. Women may bear normal babies after moderate doses of radium and this form of therapy is free from

mortality and morbidity. Curtis believes we should advance the age limit from forty to forty-three or forty-four for the application of radium. He reported three cases where carcinoma was found after radium had been used during previous years for a benign condition. Ward reported a similar experience.

Phaneuf (N.Y.O.S.) is of the opinion that radium finds its greatest field of usefulness in women near or at the menopause, having severe hemorrhages from uteri showing no gross macroscopic lesions as in hypertrophy and hyperplasia of the endometrium. However, he also employed this form of therapy in seven cases of puberty bleeding using doses from 400 to 600 mg. hours. This paper aroused a lengthy discussion. Ward suggested giving young girls very small doses of radium with the understanding that the treatment may have to be repeated. Permanent amenorrhea may result from a dose of 500 to 600 mg. hours. He also took up the matter of technic and pointed out the necessity for fastening the radium in situ. Taylor uses only one-half the dose recommended by Phaneuf (1,800 mg. hours) for fibroids and cautions that women should remain in bed a few days after the radium has been removed until the reaction in the peritoneum has subsided. Healy advocated a maximum of 600 to 700 mg. hours for each capsule in benign conditions and he does not apply more than 300 mg. hours as a primary dose for girls up to twenty years of age. Corseaden found that bleeding was controlled in 85 per cent of women who received 1,200 mg. hours whereas it ceased in 97 per cent of those who were given 1,800 mg. hours. He is of the opinion that women who receive 6,000 to 8,000 mg. hours of radium have fewer menopausal symptoms than those who receive only 1,500 to 1,600. He also believes that radium therapy for hemorrhages after the menopause is likely to be followed by trouble years later. He prefers operation in older women. Dannreuther could not agree that it is necessary to use radium at all for menorrhagias of the adolescence. He described the routine treatment which has given him perfect results in these cases. Kaplan found that women under fifty cannot always be castrated with x-rays but that beyond fifty, x-ray castration always occurs. In women under 20, castration is never permanent. Matthews warned against using radium in the presence of contraindications such as chronic inflammation in the pelvis. W. S. Smith found that he had to increase the dose from 1,200 to 2,400 mg. hours in order to secure satisfactory results in cases of metritis. On the other hand Peightal began with 500 mg. hours and gradually advanced it to 1,500 but now finds he can obtain just as good results with only 700 to 900 mg. hours. Phaneuf also is now going back to smaller doses than 1,800 mg. hours.

Cutler (O) discusses the principles underlying the radium treatment of carcinoma of the cervix, and describes and illustrates a technic by which small quantities of radium may be used effectively in the treatment of this disease.

A very interesting and timely paper was the one read by Pemberton (A.G.S.) on complications of radiation treatment in gynecology. He referred particularly to damage done to the bladder and intestinal tract months and years after treatment with radium and/or x-ray for gynecologic conditions. He described the symptomatology and treatment of these complications but also, and more important, means of preventing most of them. One of the best suggestions made is to adhere to the dictum that no patient who has a history of a previous pelvic inflammation or operation should be treated with radium. Healy emphasized that these injuries may occur after as small a dose as 1,000 mg. hours applied within the uterine cavity. Ward took occasion to point out the unnecessary suffering which results from the prevailing opinion that the application of radium is an extremely simple process and that anybody can do it. Minor or severe complications occurred in 21.3 per cent of Ward's 558 cases of cervical carcinoma, whereas, among 106 cases of fundus carcinoma complications were observed in only 11.4 per cent. Hunner is disgusted with the advertisements of commercial radium concerns and asks what the incidence of damage must be in the hands of the inexperienced if even the skilled radiologists have such a high incidence of untoward results.

Macfarlane (O.S.Pa.) found in the literature reports of 29 cases where carcinoma developed after x-ray treatment of the uterus for benign conditions such as myomas (18 cases) and climacteric bleeding (11 cases). Since the number of cases is small, the possibility of a subsequent malignancy should not contraindicate the use of radium or x-ray.

Philipp (G.R.S.) reported the occurrence of bone diseases in women who had received radiation therapy for carcinoma of the uterus. The bones affected were

the hips and the heads of the femurs, hence he warns against too energetic radiation to the patient's sides.

Bernard (P.O.G.S.) reported seven cases where he employed roentgen rays under the mistaken notion that he was irradiating myomas. He admonishes that if a tumor does not diminish in size rapidly after irradiation therapy this form of treatment should be stopped. Faure mentioned that in about 15 cases he has seen irradiated ovarian cysts become carcinomatous.

Caffier (O) reported a series of 33 women who were castrated by means of roentgen rays for various indications, chiefly fibroids, but who returned within three years because of the recurrence of bleeding. Since in recent years there has been an increase in the number of such cases, more care should be exercised in selecting cases for roentgen ray therapy rather than for operation.

OPERATIVE TECHNIC

The only operative condition about which there was much discussion last year was prolapse of the uterus. Frank (A.G.S.) followed up 231 patients and found that the results of his operations had been satisfactory in only 66 per cent of his cases. As a result of this stock-taking, he plans to continue his technic for anterior and posterior colporrhaphy in cases of cystocele and rectocele unaccompanied by prolapse of the uterus. However, in cases of prolapse in young women he will use the Fothergill operation and in old women with complete prolapse he will employ a simplified vaginal hysterectomy and in poor operative risks, the Le Fort operation. In the discussion, H. O. Jones said he uses a modified Mayo vaginal hysterectomy and G. G. Ward removes the peritoneal culdesac and unites the uterosacral ligaments to prevent the development of an enterocele. Baer prefers the Halban operation which is applicable in the childbearing period as well as in the menopausal years. Mestitz (O) describes and illustrates the Halban technic. In this operation the vesical peritoneum is pulled out into the vagina until its fixed point on the parietal peritoneum is reached. The fundus uteri is attached to this parieto-vesical angle in the abdominal wall from below. It is essential to shorten the length of the uterus to three inches by cervical amputation, after which the pelvic floor is repaired.

C. J. Miller (A.C.S.) emphasizes that in young women, unless independent uterine disease exists only those measures should be employed which in addition to correcting the hernia, conserve function and permit safe future pregnancies. For these women Miller prefers a vaginal plastic operation combined with the Simpson modification of the Gilliam suspension. For elderly women he employs vaginal operations, either the Watkins transposition or vaginal hysterectomy.

Maier and Thudium (O.S.Pa.) are firmly convinced that the Fothergill operation should be adopted as the standardized operation for the treatment of genital prolapse. They describe and illustrate this operation. Laws (O.S.Pa.) is of the opinion that the majority of cases of genital prolapse after the menopause are best treated by vaginal operations including subvesical interposition and the Mayo vaginal hysterectomy.

Koenig (F.C.G.) favors the Halban operation for prolapse of the uterus, whereas Labhardt (F.C.G.) recommends subtotal colpoperineocleisis under local anesthesia. The latter author prefers this type of almost complete closure of the vagina to the LeFort operation because in several cases incontinence of the bladder followed the Le Fort operation.

Buermann (A.M.A.) and Masson (A.M.A.) discussed the symptoms, diagnosis and treatment of vaginal enterocele or true vaginal hernia. The former author found that 86 of these cases were reported in the literature including three of his own. Masson reported that 16 of these cases were seen at The Mayo Clinic.

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SOCIETIES

1. **A.A.O.G. & A.S.**, American Association of Obstetricians, Gynecologists and Abdominal Surgeons
2. **A.C.S.**, American College of Surgeons
3. **A.G.S.**, American Gynecological Society
4. **A.M.A.**, Section on Obstetrics and Gynecology and Abdominal Surgery, American Medical Association

5. **A.M.N.N.J.**, Section of Obstetrics and Gynecology, Academy of Medicine, Northern New Jersey
6. **A.S.R.A.N.Y.A.M.**, American Society Regional Anesthesia, New York Academy of Medicine
7. **B.G.O.S.**, Berlin Gynecological and Obstetrical Society
8. **B.G.S.**, Brooklyn Gynecological Society
9. **B.M.A.**, Section on Obstetrics and Gynecology, British Medical Association
10. **B.O.S.**, Boston Obstetrical Society
11. **B.S.G.O.**, Belgian Society of Gynecology and Obstetrics
12. **C.A.O.G.**, Central Association of Obstetricians & Gynecologists
13. **C.C.St.L.C.**, Clinical Conference of the St. Louis Clinics
14. **C.G.S.**, Chicago Gynecological Society
15. **D.G.S.**, Dresden Gynecological Society
16. **D.O.G.S.**, Detroit Obstetrical and Gynecological Society
17. **E.O.S.**, Edinburgh Obstetrical Society
18. **F.A.M.**, French Academy of Medicine
19. **F.C.G.**, French Congress of Gynecology
20. **G.G.S.**, German Gynecological Society
21. **G.R.S.**, German Roentgen Society
22. **G.S.G.S.**, Gynecological Society of German Switzerland
23. **G.S.H.M.S.**, Gynecological Section of Hungarian Medical Society
24. **I.M.S.**, Illinois Medical Society
25. **K.G.S.**, Kinki Gynecological Society (Japan)
26. **L.A.O.S.**, Los Angeles Obstetrical Society
27. **M.M.S.**, Section of Obstetrics and Gynecology, Massachusetts Medical Society
28. **M.R.O.G.S.**, Middle Rhine Obstetrical and Gynecological Society
29. **M.S.C.M.S.**, Memphis and Shelby County Medical Society
30. **N.E.G.G.S.**, North East German Gynecological Society
31. **N.E.O.G.S.**, North of England Obstetrical and Gynecological Society
32. **N.M.S.M.**, Neisserman Medical Society of Massachusetts
33. **N.Y.A.M.**, Section on Obstetrics and Gynecology, New York Academy of Medicine
34. **N.Y.O.S.**, New York Obstetrical Society
35. **N.W.G.G.S.**, Northwest German Gynecological Society
36. **O.**, Paper not presented before a medical society
37. **O.P.M.S.**, Orleans Parish Medical Society
38. **O.S.Pa.**, Obstetrical Society of Philadelphia
39. **P.O. & G.S.**, Paris Obstetrical and Gynecological Society
40. **P.M.S.S.**, Pavia Medical and Surgical Society (Italy)
41. **P.S.O.G.**, Portland Society of Obstetricians and Gynecologists
42. **R.H.M.S.**, Gynecological Section of Royal Hungarian Medical Society
43. **R.S.M.**, Section Obstetrics and Gynecology, Royal Society of Medicine
44. **St.L.G.S.**, St. Louis Gynecological Society
45. **S.E.G.S.O.G.**, South East German Society of Obstetrics and Gynecology
46. **S.G.S.**, Swiss Gynecological Society
47. **S.M.A.**, Section on Obstetrics, Southern Medical Association
48. **S.O.G.S.**, Strasburg Obstetrical and Gynecological Society
49. **T.O.G.S.**, Toscanny Obstetrical and Gynecological Society (Italy)
50. **U.R.O.G.S.**, Upper Rhine Obstetrical and Gynecological Society
51. **V.O.G.S.**, Vienna Obstetrical and Gynecological Society

Item

American Board of Obstetrics and Gynecology

The next written examination and review of case histories for certification by the American Board of Obstetrics and Gynecology will be held, according to location of applicants, in various cities of the United States and Canada, on Saturday, December 9, 1933, at 2 P.M. For application blanks and further details, address, Paul Titus, M.D., Secretary, 1015 Highland Building, Pittsburgh, Pennsylvania.

de Snoo, K.: The Significance of Preventive Obstetrics for Mother and Child.
Monatschr. f. Geburtsh. u. Gynäk. 91: 1, 1932.

During the years 1928, 1929 and 1930, 5432 obstetric patients registered in de Snoo's clinic in Utrecht. These women were seen on an average of 4.7 times during pregnancy. Of the 465 women who were admitted to the hospital before delivery mostly for social reasons, contracted pelvis and toxemia, two died undelivered (abruptio placentae and heart failure), and five died after labor (embolus 2, pneumonia 1, postpartum hemorrhage 1, and apoplexy 1). Of the 4969 delivered at home 3 died (sepsis 2, pulmonary tuberculosis 1). The total mortality therefore including abortions is 12 in 6012 cases or 0.2 per cent. Without abortions the mortality was 0.18 per cent. The mortality in the 465 hospital cases was 1.5 per cent and in the 4969 home cases it was only 0.06 per cent. The frequency of forceps delivery was 2 per cent, of breech extraction 0.7 per cent, of version and extraction 0.23 per cent and of cesarean section only 0.07 per cent.

Of the 6010 children, 85.8 per cent were full term, 3.7 per cent were premature and 10.6 per cent were immature or abortions. The fetal death rate for the full-term children was 1.5 per cent and for the premature babies it was 27 per cent. The total mortality for the viable children was 2.3 per cent.

The author is satisfied with his results except in cases of placenta previa. He has tried out various procedures and now favors the use of a colpeurynter because it is the least harmful for the mother.

The mortality from puerperal sepsis in Holland is 0.7 per cent. In Rotterdam among 21,533 obstetric patients delivered by midwives there were only 14 deaths due to puerperal sepsis. The midwives are not permitted to give any uterine stimulants or narcotics. They are taught to correct malpresentations, to examine the urine and to take the patient's blood pressure regularly. They can be trusted to use antisepsis and asepsis and they recognize the dangers of conveying infection from infected women to healthy gravidae. Sixty per cent of all deliveries are performed by midwives.

J. P. GREENHILL.